Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

REPEAT ORDERS

SAND PUMPS *in* GLASS PLANT

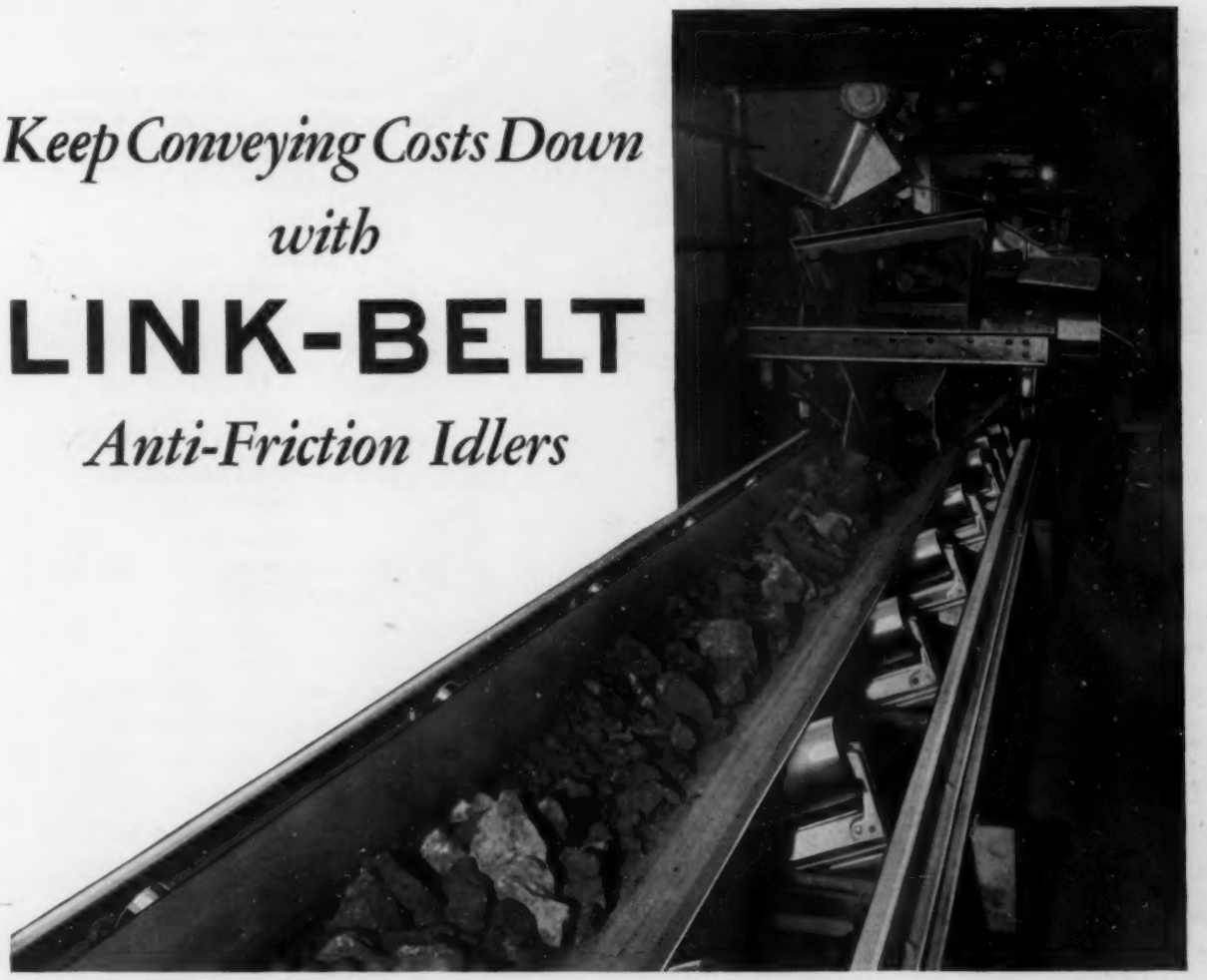
12 HYDROSEAL PUMPS ordered in less than one year (six repeat orders) for the Glass Manufacturing Dept. of the Rouge Plant of Ford Motor Co., which is the "largest single industrial development in the world".... These Maximix Rubber Lined Pumps handle various grades of sand used for polishing the safety plate glass of the Ford and Lincoln Automobiles.... Reliability and Economy are obviously essential characteristics of all equipment which has any part in a high speed production schedule. Send for the new, revised, enlarged Hydroseal Pump Catalog No. 937, covering our complete line of Sand, Slurry and Dredge Pumps.

HYDROSEAL MAXIMIX RUBBER PROTECTED SAND-SLURRY-DREDGE PUMPS

Keep Conveying Costs Down with

LINK-BELT

Anti-Friction Idlers



Link-Belt 30-in. wide anti-friction belt conveyor fed by traveling manganese steel apron feeder handling run-of-mine copper ore.

POSITIVE SELF-ALIGNING IDLER

This Link-Belt positive self-aligning idler automatically and positively maintains troughed conveyor belts central at all times. It has met with unqualified success, and is preferred by many who have heretofore used the counterweighted disc type of self-aligning idler.

● Free turning, accurately made idlers assure the belt conveyor a good roadbed for economical operation . . . minimum friction loads . . . long belt life . . . and the lowest maintenance cost. Link-Belt makes a full line of anti-friction pressure lubricated idlers, as well as all necessary machinery and driving parts for the complete conveyor.

Submit your conveying and power transmission problems to Link-Belt. Send for catalog. Address Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our offices located in principal cities.

1940

Rock Products

With which has been consolidated the journals

CEMENT and ENGINEERING NEWS CONCRETE PRODUCTS

Founded 1896 Est. 1918

Recognized the World Over as the Leader in Its Field

VOL. 41 CHICAGO, OCTOBER, 1938 No. 10

CONTENTS

Departments

OWNED AND PUBLISHED BY

TRADEPRESS PUBLISHING CORPORATION

Publication Offices

205 WEST WACKER DRIVE, CHICAGO, ILL.

TELEPHONE—CENTRAL 0670

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Indexed in the Industrial Arts Index. Published Monthly. Subscription Price: United States and Possessions, Mexico, Cuba, Canada, $2.00; and $4.00 to foreign countries. Twenty-five cents for single copies.

To Subscribers—Date on envelope indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

ROCK PRODUCTS
Bears the Twin Hall-Marks of Known Value

Impartial measurement of reader interest in terms of paid circulation

Authentic facts relating to editorial scope and readership analysis

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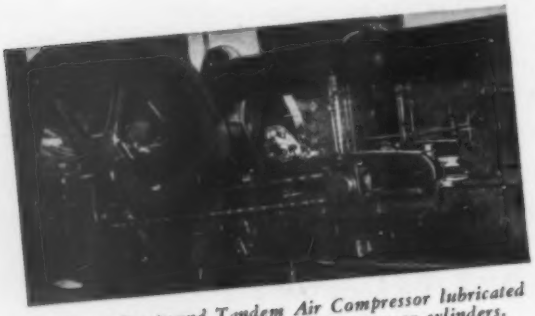
for National Gallery of Arts Building

IN WASHINGTON, D. C.



Sullivan Compound Tandem Air Compressor lubricated with Texaco, both for steam and compressor cylinders.

Sullivan Air Compressors in the power plant of Tennessee Marble, Inc., Knoxville, Tenn. Entire quarry 100% Texaco lubricated for many years.

TENNESSEE NOW RANKS SECOND as a marble quarrying State. Tennessee Marble, Inc., Knoxville, ranks among the foremost quarries of the entire State.

For 14 years the Sullivan compressors shown, and other equipment throughout the quarry, have been lubricated with Texaco. No repairs . . . no replacements ever have been necessary, reports Alexander Harris, President of Tennessee Marble, Inc.

You, too, can get outstanding results with Texaco, lubricating compressors and Diesels, portable or stationary. Trained lubrication engineers will help you to make a right selection.

NEW—*Texaco's latest booklet on rock drills, their care and lubrication. 36 pages illustrated with diagrams and pictures of drills and equipment. Write for copy. It's* **FREE.**

Get in touch with the nearest of our 2186 warehouses, or write: The Texas Company, 135 East 42nd St., N. Y. C.

TEXACO

TEXACO *Compressor* LUBRICANTS

Save POWER

RAYMOND BOWL MILL FIRING

- No metal-to-metal contact in grinding
- Smooth, quiet, vibrationless operation
- Easy control and adjustments from outside
- Maintained uniformity in coal grinding
- Standard type motor direct-connected to mill and fan.
- Fan on "cold side" allowing high inlet temperatures for drying
- Record low maintenance costs

IT is when the Bowl Mill paces another machine in the same plant, that its economy shows up to the best advantage. In a recent installation for direct firing rotary kilns, a Bowl Mill is operating near a competitive grinding unit that is serving the same size kiln.

A comparative record on monthly runs indicates that the Bowl Mill is averaging 30% less KWH per ton of coal fired. Such savings are the general experience of Bowl Mill users throughout the cement and lime industries. Power economy is just one of many reasons why it pays to modernize your plant with Bowl Mill Firing.

RAYMOND PULVERIZING DIVISION
Combustion Engineering Company, Inc.
1307 North Branch Street CHICAGO
Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal

Entirely new pulverizing principle---greatest advance in thirty years

MORE HOLES PER SHIFT WITH TIMKEN ROCK BITS

Mine operators can get more holes per shift at lower cost with TIMKEN Bits due to faster drilling; more footage per bit; less tramming; no waiting for steel at working face.

The design of the TIMKEN Bit and the material from which it is made—TIMKEN Electric Furnace Steel—assures (1) faster penetration by making possible an even distribution of the drill blows through the bit. (2) protection of the threads against injury. (3) reduced steel breakage.

The streamlined construction of the TIMKEN Bit permits holes to be blown out cleaner, thus making it easier to withdraw the steel.

TIMKEN Bits have been adopted by some of the world's largest metal mines with large savings for the operators. It will pay you to use them.

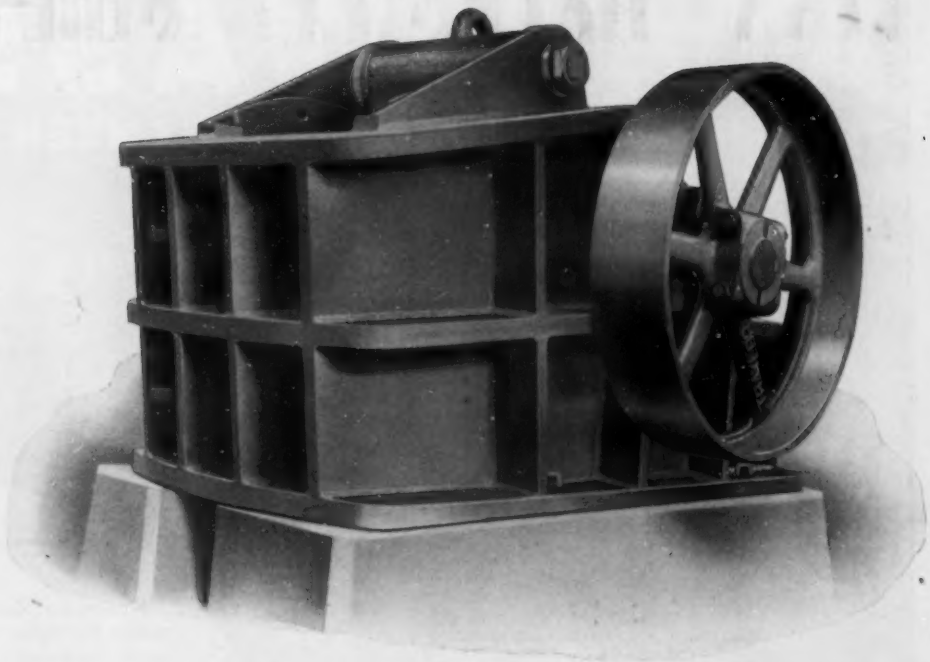
TIMKEN Bearings are used on all locomotives and many of the cars of the new 20TH CENTURY LIMITED

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
ROCK BITS

the crusher you've been waiting for



TRAYLOR

TYPE H JAW CRUSHER

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Welded or Riveted Stacks, Tanks and Bins for any purpose.

SPECIFICATIONS:—

1. Advanced, simplified Blake design.
2. Full-welded all-steel frame.
3. Improved Swing Jaw Suspension.
4. Patented (U.S. No. 1,837,102 and five foreign patents) Curved Jaw plates—the same principle as that of the Traylor Original, Patented, Non-Chokable Bell Head and Curved Concaves made world-famous by our TY and TZ Gyratory Crushers.

Results secured:—

1. Double the capacity of old types of Blake Crushers.
2. Smaller product.
3. More uniform product.
4. NO increase in horsepower and therefore halving the power-per-ton factor.
5. Lower maintenance expense.

Sizes available—

10" x 16" to 30" x 36"

If the size range shown includes your requirement, the Type H is the best "buy" you can make. The proof?—Get our Bulletin 1105.

TRAYLOR ENGINEERING & MANUFACTURING CO.

ALLENTOWN, PENNSYLVANIA, U.S.A.

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THE CANADIAN FAIRBANKS-MORSE CO., LTD., 980 St. Antoine St., Montreal, P. Q. Canada

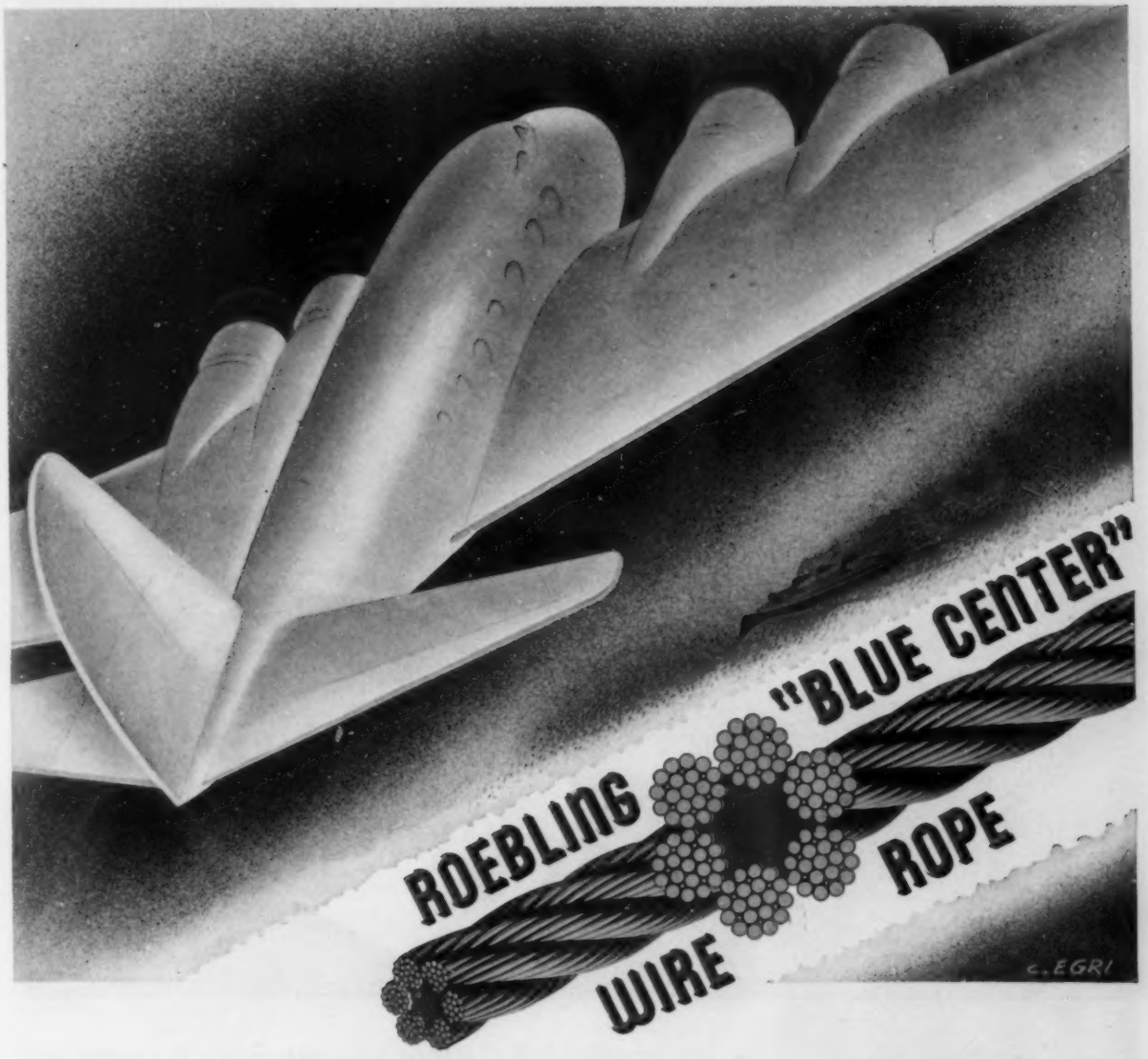
B. C. EQUIPMENT CO., Vancouver, B. C., Canada

MAQUINARIA INTERNACIONAL S. R. L., Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F.

MANILA MACH. & SUPPLY CO., INC., Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro

REACHING NEW HEIGHTS!



New heights of rope safety and economy are being gained through the use of Roebling "Blue Center". Investigate this rope, the highest development of Roebling's over 90 years of rope making experience.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N.J.
BRANCHES IN PRINCIPAL CITIES

STRONGER—Wire of highest strength consistent with ductility and toughness

TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

SAFER—Unequalled for uniformity of quality

SAVING—Insures lowest general average operating cost

THE HIGHEST DEVELOPMENT IN ROEBLING WIRE ROPE

DEMPSTER DUMPSTER Announces

LOADING

DUMPING

The new Model "LF" (Load Forward) carries the entire load *on* the truck chassis. Eliminates all "Overhang" and "Sidesway" of the detachable containers in traveling.

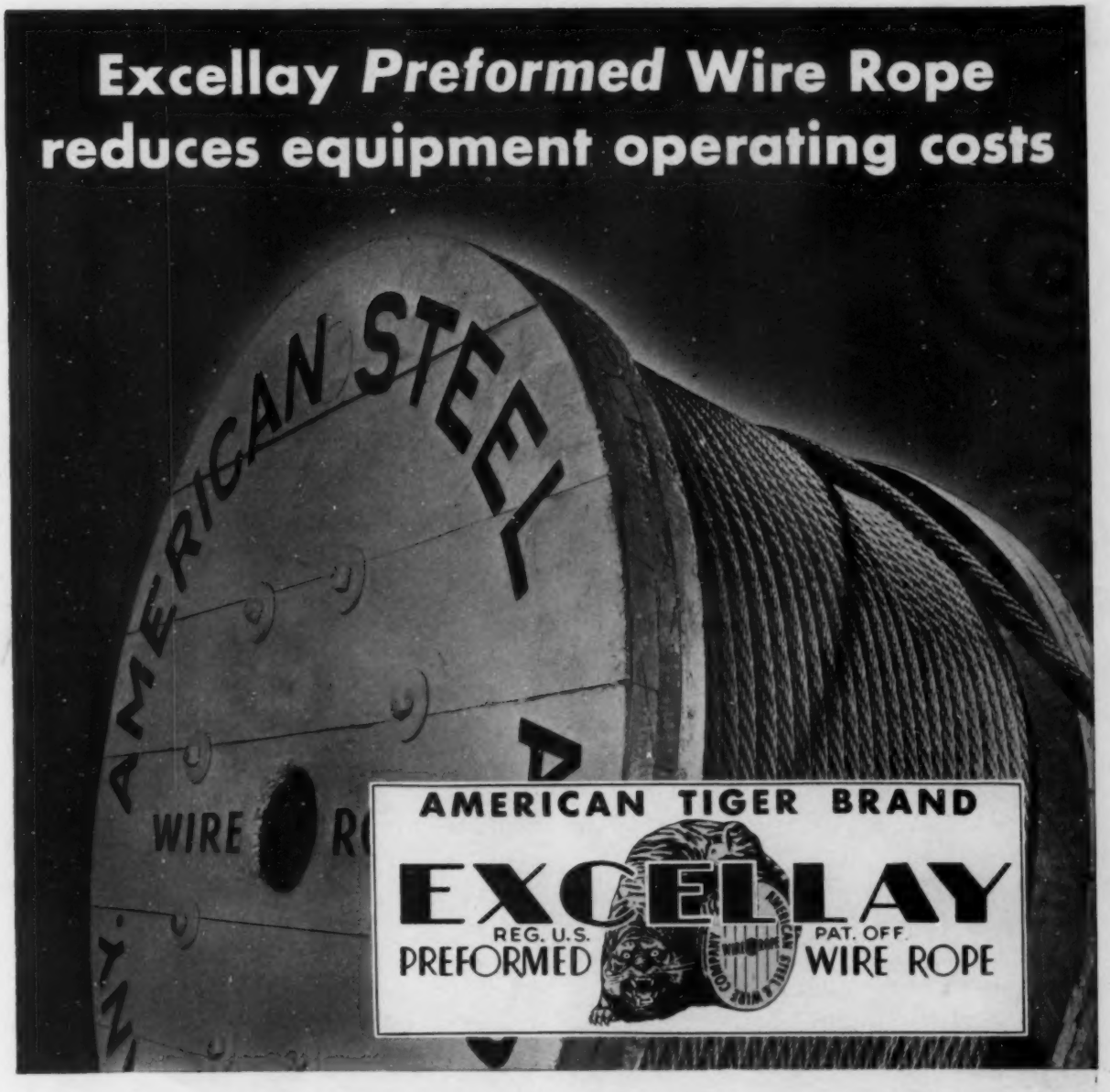
The Model "LF" enables any 1½ ton truck to handle detachable containers up to and including 2 cubic yards capacity rock or similarly heavy materials with the utmost ease.

This new Model uses the standard Dempster-Dumpster Detachable Containers with their exclusive features including positive but easy control in all positions, automatic bottom dump, self-cleaning, etc.

For further details—Call—Wire—or Write

DEMPSTER BROTHERS, Inc. KNOXVILLE TENNESSEE

Excellay *Preformed* Wire Rope reduces equipment operating costs



WIRE rope users are turning more and more to American Tiger Brand EXCELLAY Preformed Wire Rope because its many advantages can be summed up in a single word — *Economy.*

EXCELLAY Preformed Wire Rope is "relaxed." It is free from the internal stresses present in standard rope. This enables it to withstand fatigue to a greater degree. It does not break up so quickly from abrasive wear. It resists kinking and winds smoothly and easily on the drums, reducing uneven wear and drum abuse. It is easier to splice, easier to install, and safer to handle.

Specify EXCELLAY Preformed Wire Rope and get greater value for your money. Our engineers will be glad to cooperate with you.

You can depend upon the wire rope on the Yellow Reel

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY, *San Francisco*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

TELSMITH
QUARRY PLANTS IN THE ARGENTINE

Telsmith Breaker has concrete around upper edge of its crown, and two walls 6 ft. apart form a "bridge" on which are two sets of tracks. Rock may be dumped from cars into both sides of crusher simultaneously.

● In the Argentine . . . as well as elsewhere throughout the world . . . Telsmith crushing equipment has convincingly demonstrated its ability to produce crushed aggregate for roads and concrete building construction *at the lowest cost per ton.*

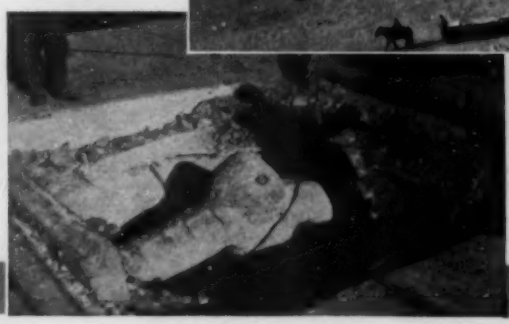
The plant pictured here is that of J. B. Ripoli & Cia. located near Olivarria, a city about 200 miles south of Buenos Aires. On an average this plant crushes about 1000 tons of very tough granite rock, per 8-hr. day, to minus 2½-in. size.

It includes two Telsmith Crushers—a 20-in. Primary Breaker and a 46-in. Reduction Crusher—shipped in December, 1931. In spite of a steady diet of hard Argentine granite, their crushing performance has been outstanding. Maintenance has been low. During its six years of service, the Reduction Crusher has had no repairs other than manganese wearing parts. The super-strong steel frame and crown and the unbreakable shaft, which distinguish Telsmith gyratory crushers, are always an assurance of continuous output.

(*above*) Crushed aggregate from Telsmith Breaker goes to a rotary scalper which removes all minus 2½ in. aggregate, and chutes oversize to a 46-B Telsmith Reduction Crusher.

(*above*) General view of plant.

(*right*) In Argentine quarries, rock is hand loaded intosidedump cars; trains are hauled up by hoist.



Top of TelsmithBreaker showing its massive crown arms set at right angles to car tracks; and great spread of its receiving bowl.

Telsmith quarry and gravel pit equipment, from crushers to bin gates, and Telsmith engineering service are described in Bulletin Q-*11. Write for it.* Q-C1-38

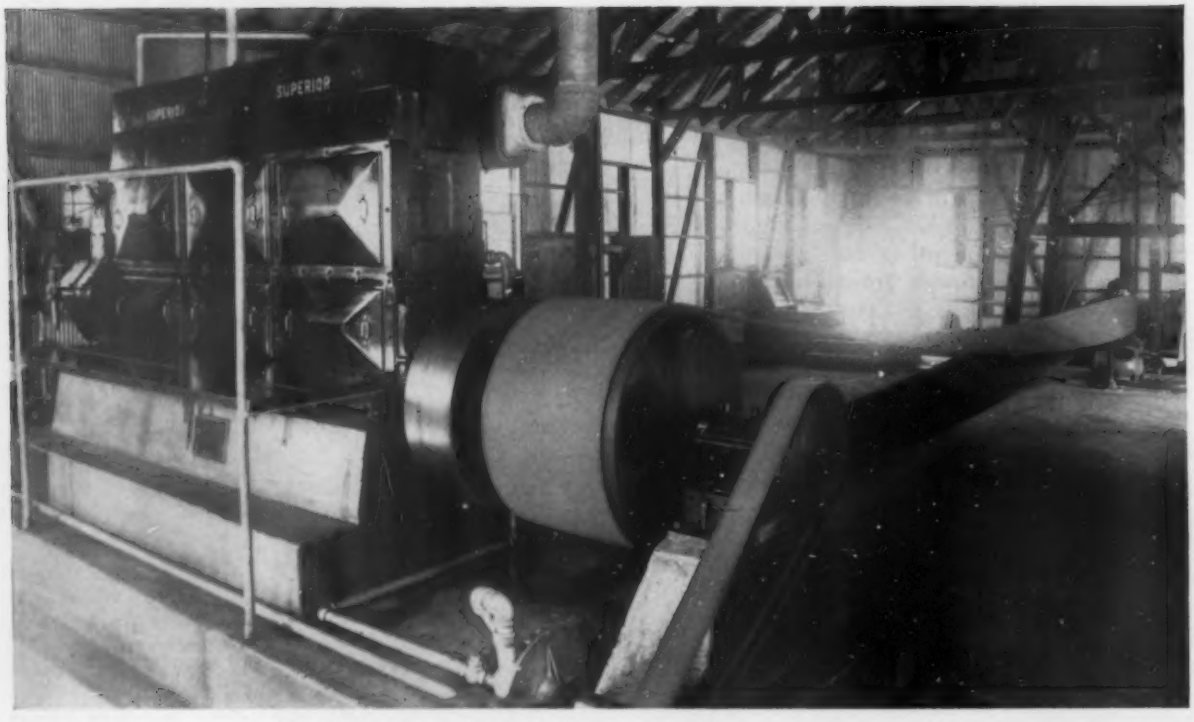
50 Church Street, New York City
211 W. Wacker Drive, Chicago, Ill.
713 Commercial Trust Bldg., Philadelphia, Pa.
81 Binney St., Cambridge, Mass.
412 Westinghouse Bldg., Pittsburgh, Pa.
Brandeis M. & S. Co., Louisville, Ky.

Associates in Canada: Canadian Vickers, Limited, Montreal and Vancouver

SMITH ENGINEERING WORKS
[illegible] CAPITOL DRIVE, MILWAUKEE, WIS.

FLOODED MINES...

....earn no profit!



The Klondike Fluorspar Corporation, Smithland, Kentucky, maintains a dry mine with a 260 H. P. Superior Diesel belted to a turbine type pump.

Cheap, dependable power from Superior Diesels makes many operations profitable, no matter how remote the location.

Generally a couple of dollars worth of fuel per day supplies power that would cost ten dollars or more any other way—and there are so many ways to use these engines. Belt them to pumps, to rock crushers, or air compressors. Connect them to generators. And remember that a combination of several drives can be taken from a single, sturdy Superior Diesel. Let us show you how and tell you what it would save.

THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

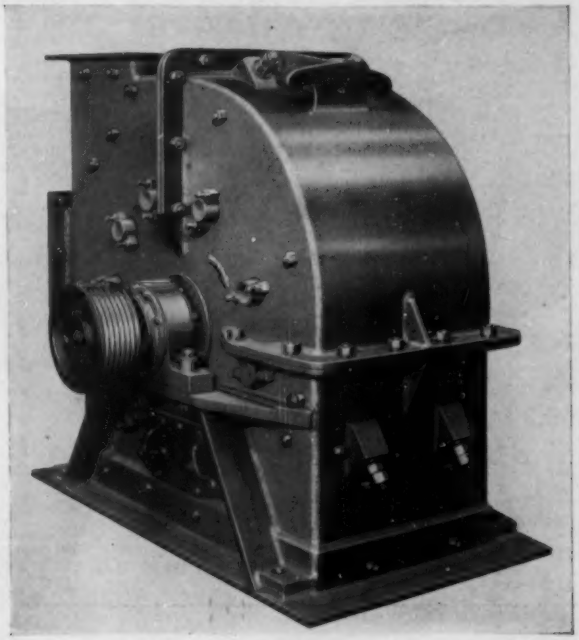
SAVE ON SERVICE COSTS WITH MULTI-IMPACT PULVERATORS

Allis-Chalmers Pulverators Reduce Wear on Hammers and Grates . . . Eliminate Power Waste!

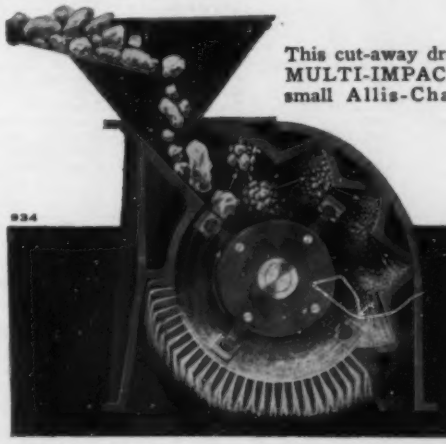
Here's how to switch from red ink to black! Here's how to cut production costs by reducing maintenance costs . . . with Allis-Chalmers MULTI-IMPACT Pulverators!

You can get bigger profits with Allis-Chalmers Pulverators because service costs have been cut to a minimum. MULTI-IMPACT action reduces wear, both on hammers and on grates* . . . replacements are less frequent. Hammers are reversible, giving double wear, and detachable from the arms. And you can replace hammers without extra cost for new arms. All wearing surfaces in MULTI-IMPACT Pulverators are protected by rugged wear-resisting liners. Large anti-friction bearings in dust-tight housings further reduce power and maintenance expense.

Find out how Allis-Chalmers MULTI-IMPACT Pulverators can save you money by reducing service costs. Get the whole story. There's an Allis-Chalmers engineer in the district office near you who can show you how to get bigger profits . . . by saving on service costs!



A MULTI-IMPACT Pulverator, feed throat opening 11½" x 25". Pulverators are built in seven sizes, with feed openings from 4½" x 9" to 11½" x 49".



This cut-away drawing shows MULTI-IMPACT action in a small Allis-Chalmers unit.

*In Allis-Chalmers MULTI-IMPACT Pulverators, most of the work is done in the upper part of the machine. The hammers revolve upward to shatter the material to be crushed, hurling it against a series of involute breaker plates for further reduction. By the time the material reaches the bottom, most of it is fine enough to go through the grates. That's the reason *why* drag is lessened . . . *why* wear is reduced . . . *why* you can save on service costs!

934

CRUSHING · CEMENT AND MINING DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

LUDLOW-SAYLOR WIRE CO.
634 S. Newstead Ave.
St. Louis, Mo.

Please send us Book No. 82.

.....

.....

.....

.....

Note these points of Quality in

STA-TRU

Long-Slot Woven Wire Screens

STA-TRU screens are specially designed for screening machines with tensioning devices which tend to stretch the crimps in ordinary screens when under load.

The straight stay-bars in STA-TRU have no crimps to stretch. They carry the full load of tension and vibration.

STA-TRU can not be caused to sag or split by the pull of tension members of vibratory screening machines.

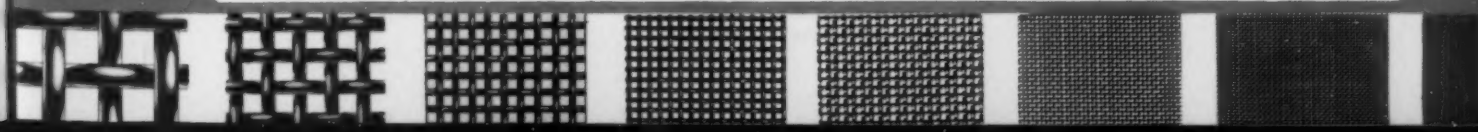
The longitudinal wires in STA-TRU screens are all in one plane between their intersections, so that all the long openings are of uniform width throughout their length.

Ask for bulletin and samples. Quotations are furnished promptly on receipt of specifications.

"The Perfect" WIRE CLOTHS and WOVEN WIRE SCREENS

— Steel — Super-Ley — Galvanized — Tinned — Monel — Nickel — Brass — Bronze — Stainless —

The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS



LUDLOW-SAYLOR WIRE CO.
634 S. Newstead Ave.
St. Louis, Mo.

Please send us Book No. 82.

Note these points of Quality in

"The Perfect"

SQUARE-MESH WIRE CLOTHS

"Perfect" weaves have the *specified* number of wires per lineal inch, throughout their area.

The mesh counts *as specified*, in shoot as well as in warp.

The wires are spaced with pains-taking precision—they lock themselves in place at every intersection—they can not creep or rub together or saw against each other.

All wires are of specified diameter, composition, color, temper and general appearance, and of the finest metal or alloy obtainable in the grade specified.

Ask for bulletin and samples. Quotations are furnished promptly on receipt of specifications.

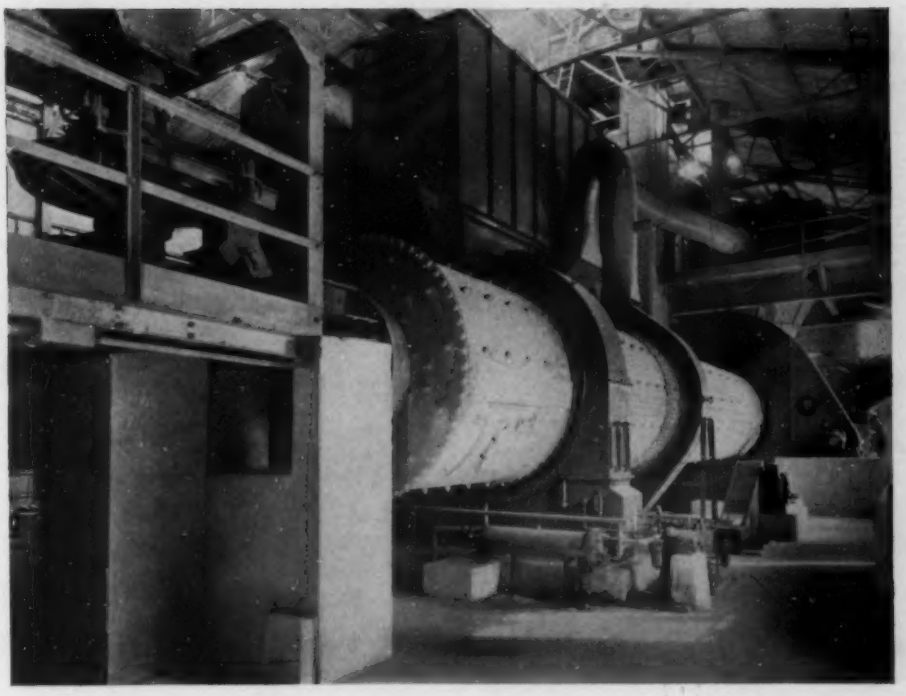
"The Perfect" WIRE CLOTHS and WOVEN WIRE SCREENS

— Steel — Super-Loy — Galvanized — Tinned — Monel — Nickel — Brass — Bronze — Stainless —

The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS

GRINDING MACHINERY

Wet grinding or dry grinding
Open or closed circuit
Gravity discharge or air swept
Combined drying and grinding
Direct firing or bin system



UNIDAN multi-compartment mill, combining granulating and pulverizing.
UNIKOM multi-compartment mill with overhung preliminary grinding chamber.
TIRAX multi-compartment air swept mill for drying, grinding coal, etc.
ATOX air swept high speed, vertical shaft mill for drying and grinding.
KOMINUTER and **BALLMILL** for granulating. **TUBEMILL** for pulverizing.

Also a complete line of accessories for the grinding operation such as air separators and classifiers, Trix wet separator, fans, liners, grinding bodies, spray casings, symetro gear boxes, feeders, conveyors, pumps, dust casings, washmills, etc.

F. L. SMIDTH & CO.

225 BROADWAY — Engineers — NEW YORK, N. Y.

Sure! If he's a worthwhile prospect he has plenty to do. But often he will work himself into a dither of frenzied activity the minute your salesman walks in. Mighty effective salesmanproof mask, too.

But every now and then this prospect of yours hangs up his mask of sales resistance and relaxes while he concentrates—concentrates on the news of the gigantic beauty shop field and the progressive ideas brought to him each month by ROCK PRODUCTS. Here you get a chance to command his undivided attention—with advertisements that will help your salesman get a bit of that prospect's time when next he calls.

The editorial money's worth of ROCK PRODUCTS can be gauged by the fact that its readers . . . your busy prospects . . . pay willingly for their subscriptions. They pay twice in fact, once in cash and again in the time they spend in reading.

Put *your* advertising in ROCK PRODUCTS. Reach *your* busy prospects, *while they are in a receptive mood.* It will work for your salesmen between their calls.

Highest editorial standards and publishing integrity.

ROCK PRODUCTS

bears the twin hall-marks of known value

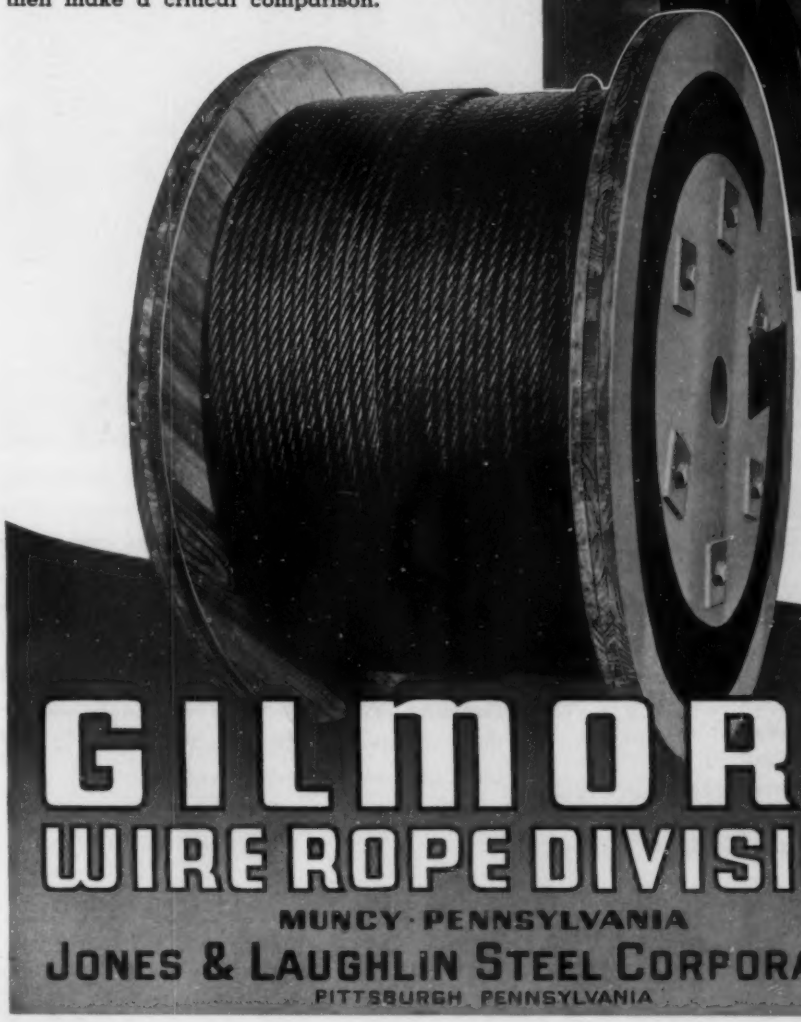
Proved reader interest in terms of paid circulation.

The

Wire Rope of today . . . and tomorrow

The new Gilmore Wire Rope is so much different than any you have ever used that it should sell for a lot more—but it doesn't. Every machine in this great new J & L plant is a precision machine.

Every approach towards perfection is embodied in these new ropes . . . no interstices to receive grit . . . no painted strand, because we cannot lubricate a strand and paint it . . . neither can anyone else, so we think you prefer to have it lubricated . . . Every Wire, Strand, Rope and Lay, precision built to 1/1000 of an inch . . . and so many other improvements, we think you should write us for further information . . . and . . . let us have your inquiry for the next replacement—then make a critical comparison.



Other J & L Steel products:

Standard Pipe in seamless and welded—Seamless Steel Boiler Tubes—Hot Rolled Shapes—Abrasion Resisting Plates—Bar mill products including Bars for Concrete Reinforcement—Bar size shapes—Track Spikes — Wire Nails and Spikes — Galvanized Sheet Steel Roofing and Siding—Woven Wire Fencing—Barbed Wire—Soft Annealed Wire.

GILMORE

WIRE ROPE DIVISION

MUNCY · PENNSYLVANIA

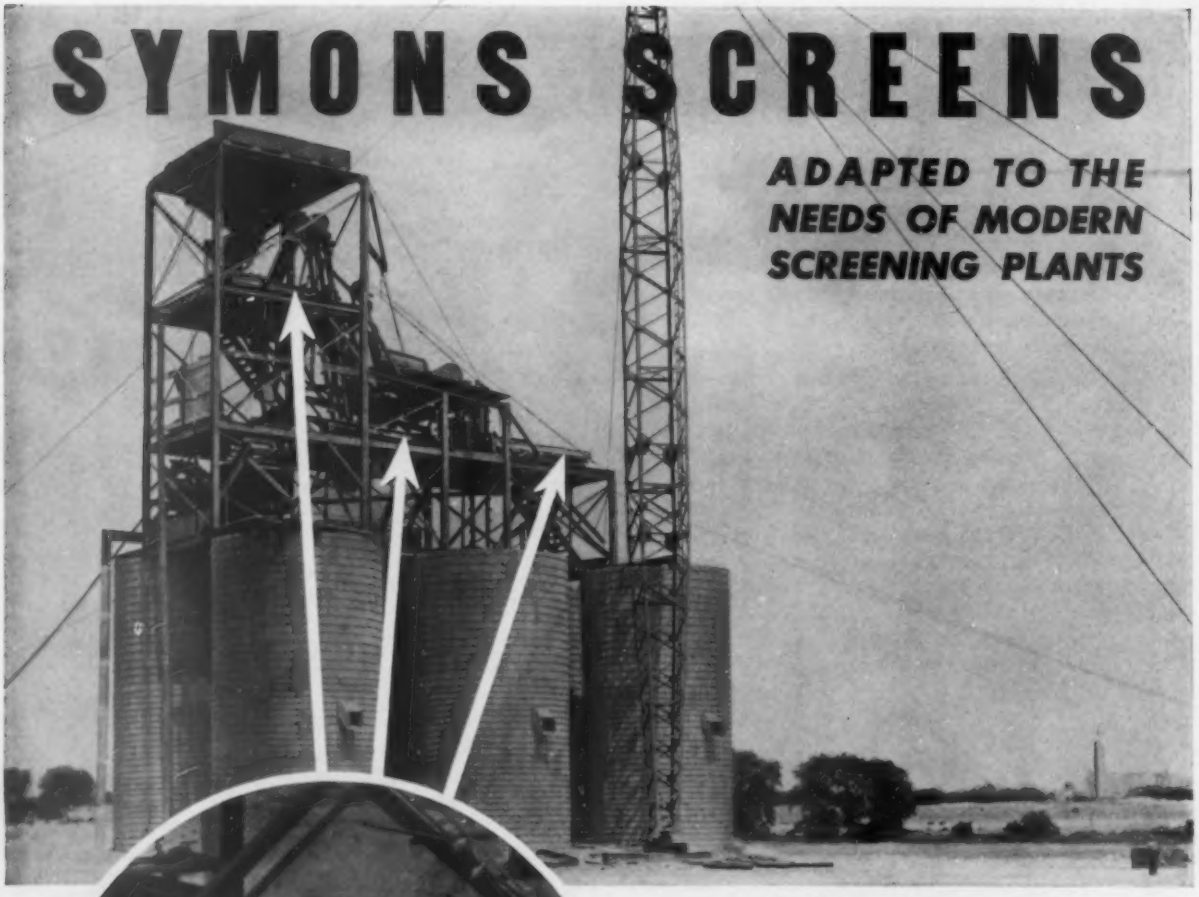
JONES & LAUGHLIN STEEL CORPORATION

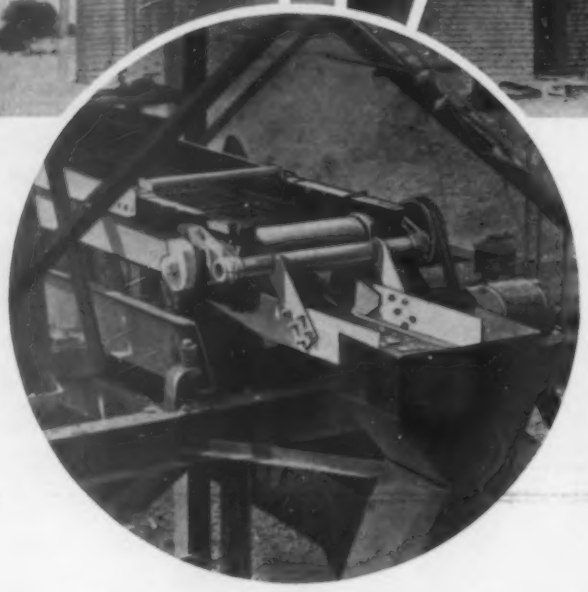
PITTSBURGH PENNSYLVANIA

J&L STEEL

SYMONS SCREENS

ADAPTED TO THE NEEDS OF MODERN SCREENING PLANTS





In addition to the 3' x 8' double deck Symons Screen with vibrating discharge shown above, there are two more Symons Screens installed here—2' x 6' and 3' x 12', both double deck.

Many innovations in design and construction are to be found at the gravel plant of the Crown Building Supply Company at Columbus, Ohio. In keeping with its modern features, three Symons Screens are being used for the screening operations. With these flat screens, it is possible to secure the closer sized and better washed materials as are specified today, furthermore, being placed level, they materially reduce headroom, building height and construction costs. With a definite trend toward flat screening, Symons Screens have many advantages of interest to those contemplating a new plant or a modernization program.

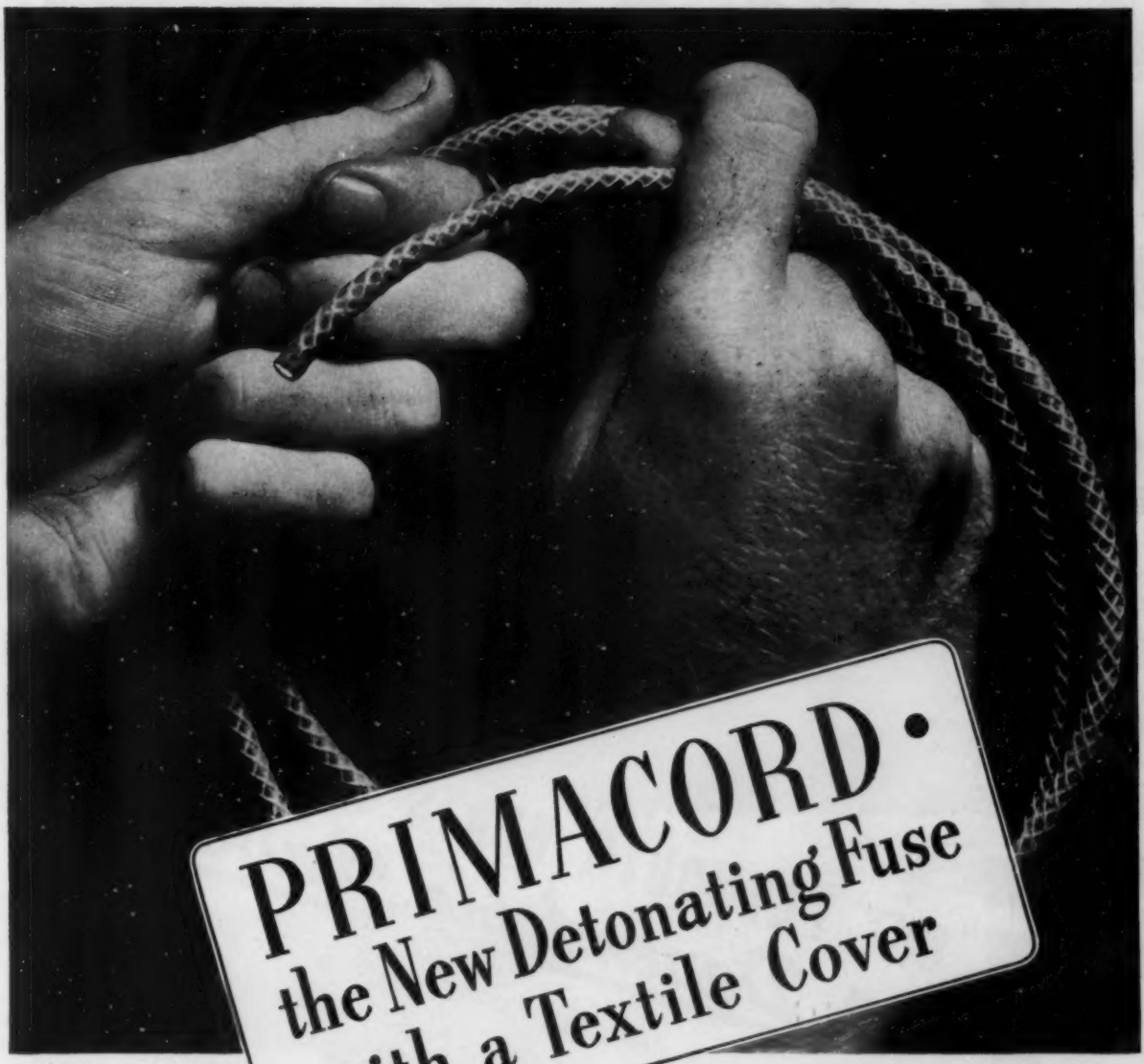
NORDBERG MFG. CO. MILWAUKEE WISCONSIN

New York City
60 E. 42nd St.

Los Angeles
Subway Terminal Bldg.

Toronto
Concourse Bldg.

London
Bush House



Primacord Bickford Detonating Fuse has definite applications to coal stripping operations. Let us tell you about them

As one good thing leads to another, Cordeau has led to Primacord, a new detonating fuse of even greater speed and ease of handling. It has a core of PETN, a powerful detonating agent with an explosive wave of 20,350 feet per second—almost 20% faster than Cordeau. Due to its special textile covering, which combines greater flexibility and minimum weight with suitable strength and waterproof qualities, it is easier to handle and speeds up operations.

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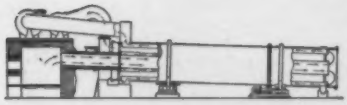
Without Contamination

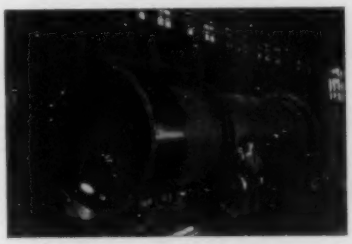


White Clay, Talc, Kaolin, Chalk, Whiting, Pigments, Fuller's Earth, and other materials must usually be dried without contamination by furnace gases. Because of the high efficiency and high capacity per unit of cost of the Class "XB" Ruggles-Coles Indirect Heat Dryer when fired with coal, coke, oil, or gas, it is much preferred to the steam dryer. Protection from overheating results by reason of the contact of only the wettest material with the highest temperature of the inner shell. A balanced temperature of the product is assured, since the material progresses toward the lower temperature end as the moisture is reduced. It is a dustless dryer—even for finely divided materials. Control of air in gas chamber is independent of that in the moisture chamber.

Low Temperature

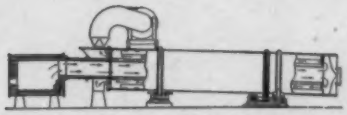
Hot air produced by air drawn through steam coils or other types of heaters is a safe method of drying at very low temperatures. Ammonium Sulphate and other salts and chemicals must be handled in this way. When necessary to prevent contamination, the shell is lined with stainless steel or other corrosive resistant metal. Use the Class "XW" Dryer.

High Temperature



Chemical changes, Roasting, Burning, or Calcining are effectively produced on many materials in a brick-lined rotary kiln. Also where feldspar, flint, pigment, and the like must be dried without contact against a steel shell, but still can be dried by direct heat at ordinary temperatures, the Class "L" Dryer is used. The refractory lining holds the heat and prevents sticking of sludge or pigment.

Low Fuel Cost



The class "XA" Ruggles-Coles Dryer has the highest thermal efficiency of any rotary dryer. Savings in fuel alone pay for it in a few years. It is the safest dryer for drying coal and coke. Where high grade silica sand is dried in this type, protection is afforded the material from fuel contamination because the combustion of furnace gases is practically complete by the time they travel through the long inner shell before contacting the material. Hundreds of them in use on sand, stone, clay, coal, coke, ores, concentrates, and many other materials.

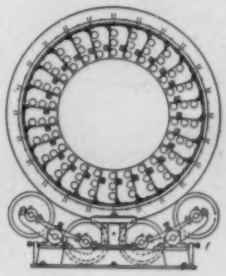
Low Installed Cost

Frequently first cost is paramount. Where such low moisture materials as sand, stone, and ores are to be dried and no unusual restrictions on them is necessary, the Class "XF" counter-flow dryer is suitable. Furnished with roller bearings, temperature control, direct drives, etc., if desired.

Protection from High Temperature Gases

The Parallel Flow Dryer has the same general features of the Class "XF" Counter-Flow dryer. Materials that burn readily but contain 40 or 50% moisture and clays that are sticky, should be dried in this type of dryer. It is used only when one of the other types described is not suitable. The Class "H" dryer, also of this principle, has special features of design for concentrates that dust readily and are sticky.

Steam Tube Dryer



Fairly high moisture materials that are not sticky, such as corn germs, tobacco stems, cork, brewery and distillery slop and fibrous materials are dried in the Steam Tube dryer. Certain pigments may also be handled and non-corrosive metals can be provided for steam tubes, shell linings, etc. Refer to the Class "C" Dryer.

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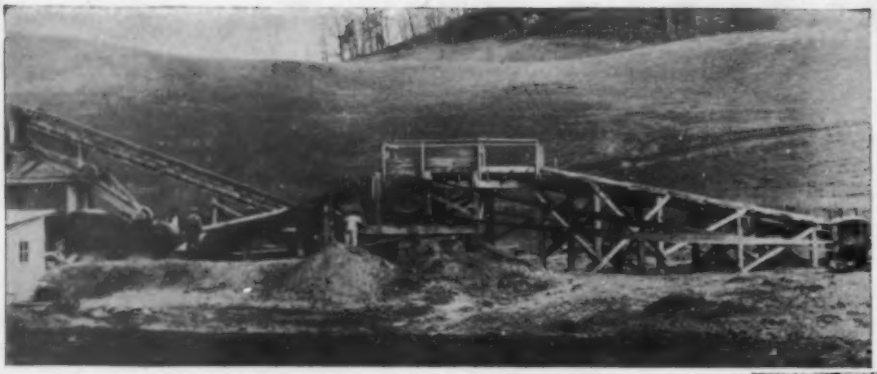

Left: Universal Dual Crusher Stationary Plant near Mountain City, Tenn., reducing field stones for road materials. Below: A new "Streamlined" Universal 1016 Jaw Crusher crushing road rock near Winston-Salem, N. C. Your crushing job, like these, can be done more profitably with Universals!

Wherever Crushing is Being Done Most Profitably..... You'll find UNIVERSALS!

because Universal Crushing Equipment produces the greatest volume of crushed rock or gravel in the shortest space of time at the lowest cost per yard.

Every detail in the design of Universal Crushers and Crushing Plants contributes to their unequalled performance—larger bearings, stronger frames, quicker product size adjustment—lower weight—features that have kept Universals out in front for 32 years!

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Streamlining gives the New 2436 Universal Jaw Crusher a stronger base, plus a saving in weight of up to 20%, providing greater portability and lower shipping and handling costs.

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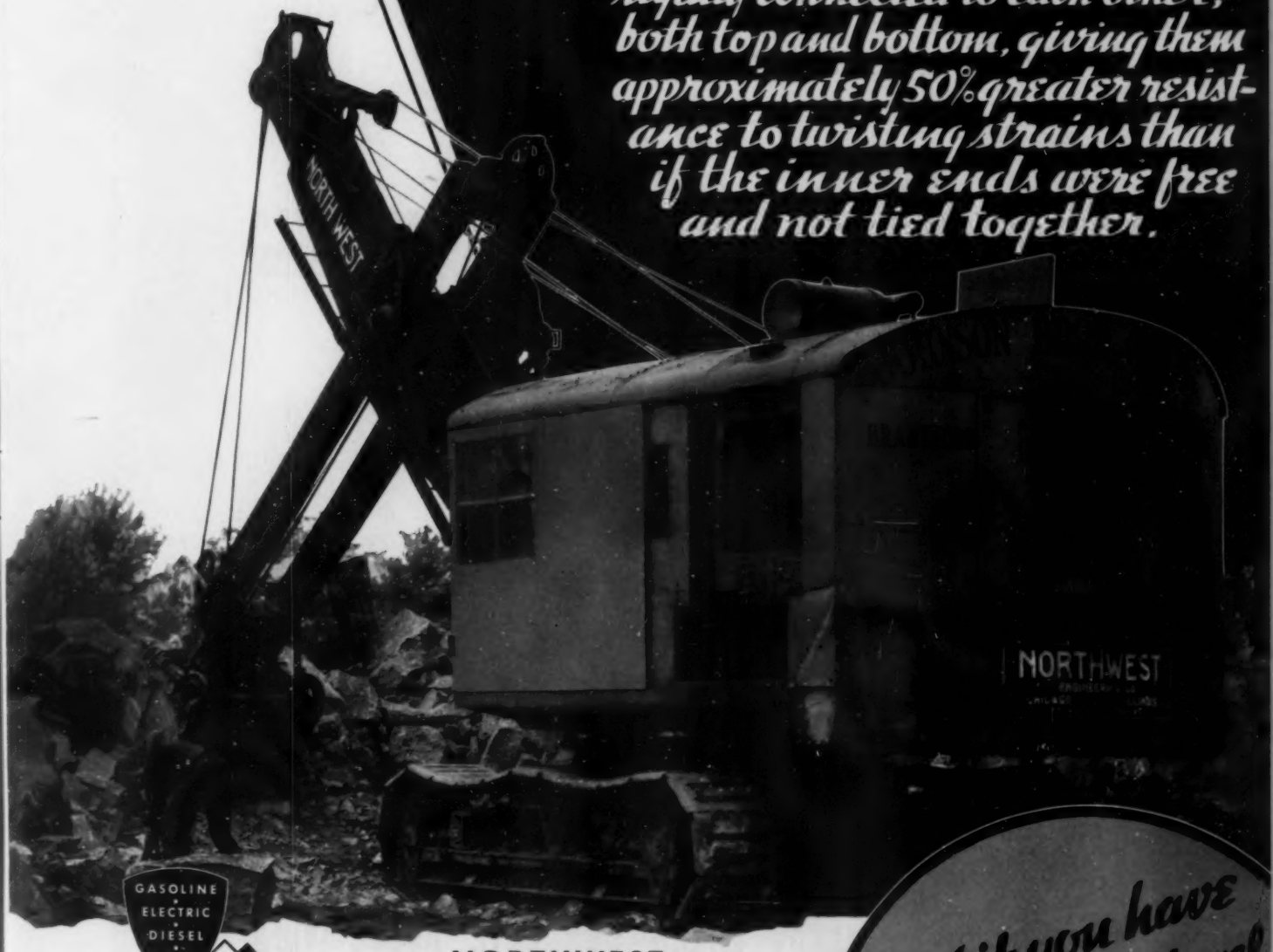

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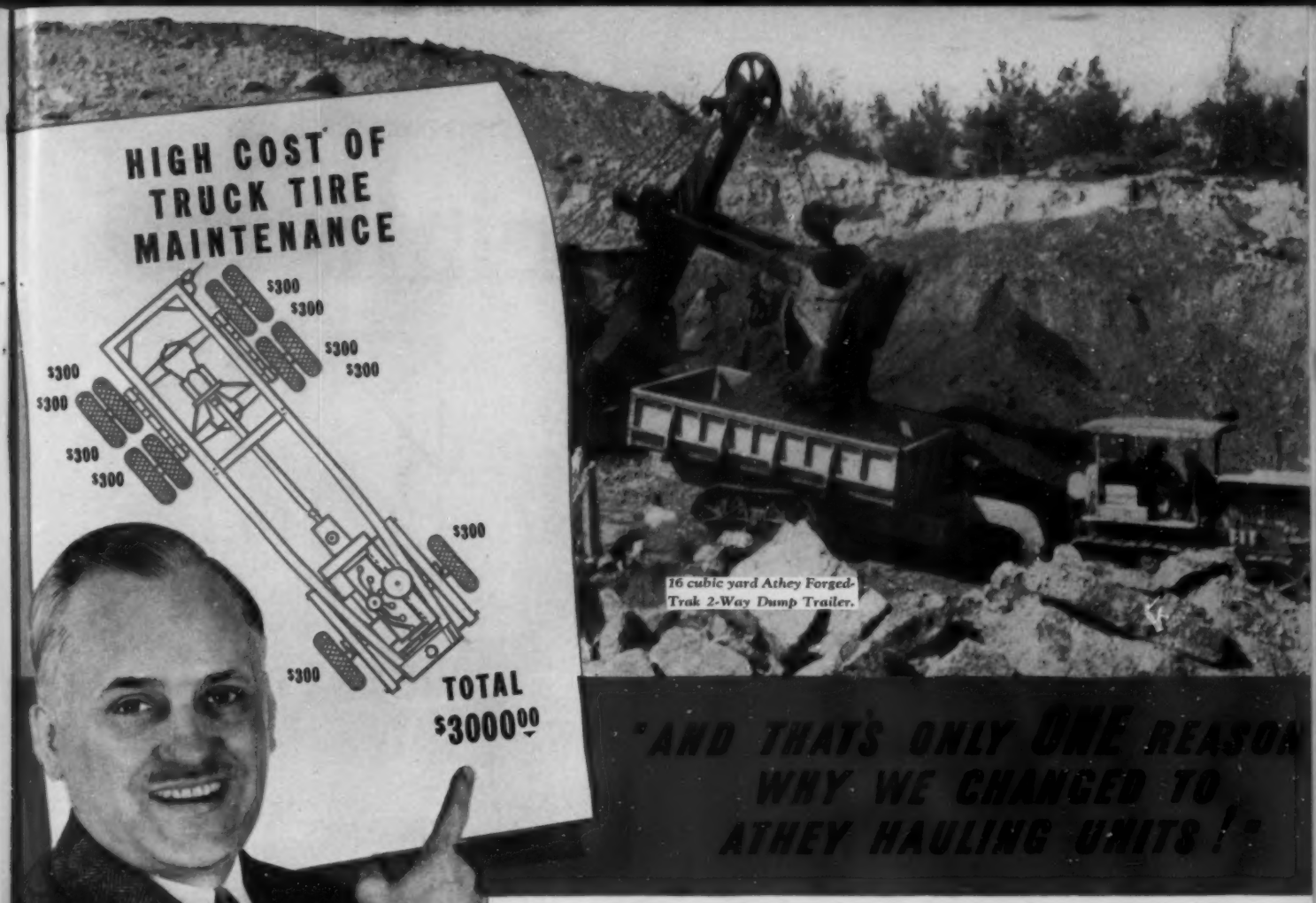

If you haul with trucks, do you actually *know* your tire costs per mile . . . per yard . . . or per hour? If you bought trucks for speed, do you *know* the real average speed your trucks travel *when off the pavement?* Tired of paying for truck repairs they didn't foresee—and speed they don't get—many operators today are turning to Athey Forged-Trak Hauling Units, pulled by "Caterpillar" Diesel tractors. See your "Caterpillar" dealer or write us.

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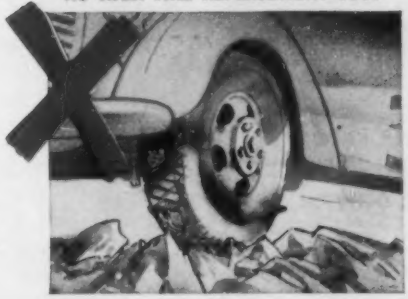

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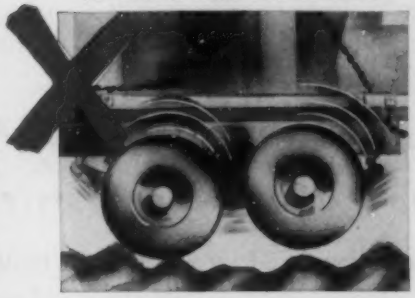

When you use Athey Forged-Trak Hauling Units, you don't need to spend good money maintaining a smooth roadbed. The broad, firm tracks of Athey equipment actually *improve* the road on which they travel . . . surmount or beat down obstacles. And Athey wheels are *non-miring.*

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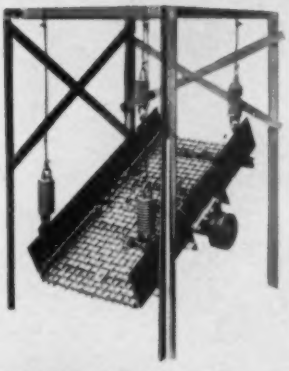

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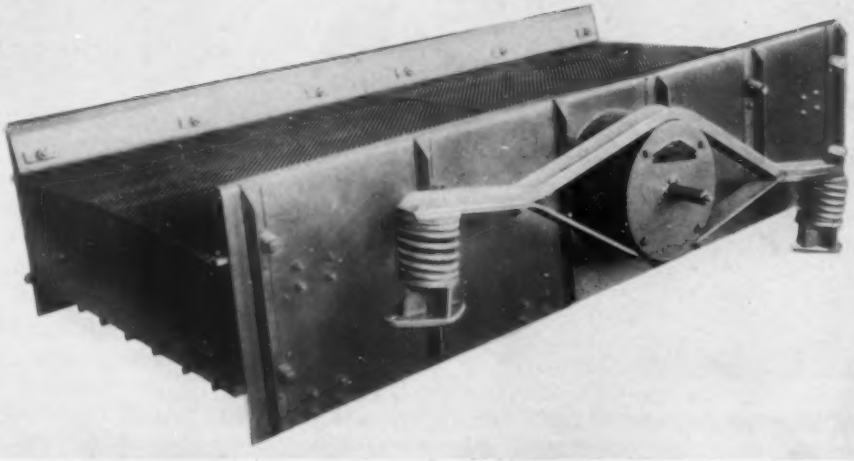

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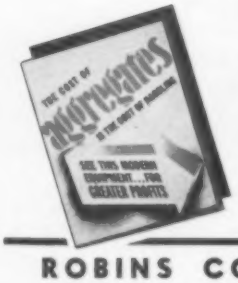

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ROCK PRODUCTS

Practical Employment Considerations

New Dealers might be forgiven if they would deal as realistically with problems involving employment of labor in private industry as they have dealt with problems of employment of capital in private industry. Their failure to do so causes honest doubt as to the sincerity of their social reform program. For, while measures to prevent abuse of capitalistic power undoubtedly have delayed investment of new capital, most honest men believe such measures were really desirable and also believe they are in the interest of sounder use of capital in the future. On the other hand, the present administration's handling of the problems involving the employment of labor has been, and is, a brake on all kinds of enterprise.

We do not refer to the wage-and-hour law which goes into effect this month. That has created only mild interest in the rock products industry, partly because very few are paying as low as the minimum wages, but largely because most producers do not consider themselves engaged in interstate commerce.

This is particularly the case in California where no aggregates at all move in interstate commerce. We presume it is also true of a large part of the sand, gravel and crushed stone industry. It certainly will take considerable time to settle this question. Another reason for lack of interest is the fact that most producers have been furnishing materials for federal-aid projects and hence have been more or less under federal regulation of wages and hours for some time.

Much more serious than the hours and wages law is the way the National Labor Relations Board operates. Practically every employer believes the Board is owned soul and body by the C. I. O. They have no faith whatsoever in its fairness or impartiality; and with much reason. It is obvious to any reasoning person that a federal agency that has so notably failed to establish a decent reputation must necessarily be lacking either in personnel or in its enabling act. It is high time for the Congress to take an interest in both. That interest is generally expected, and there is prospect of an early attempt at the next session of Congress to amend the Labor Relations Act.

All employers in every branch of industry should keep this in mind when election time comes, and in their communications with members of Congress or candidates. They can do this in all propriety in the interests of their employes, because it is their battle more than the employers'. There will be some plants permanently closed and there will be constant interruption and controversy in the construction industry, the recognized key industry for recovery, if the National Labor Relations Board continues to pursue its present policies.

Employers in the rock products industry have been accused of favoring American Federation of Labor unions. The National Labor Relations Board is systematically trying to break down contracts made with A. F. of L. unions and substitute the C. I. O. The most recent example is the case of the Cowell Portland Cement Co., California, details of which are given in our news pages.

We do not believe employers in this industry have any bias for or against either union group. They have accepted the collective bargaining features of the law in good faith and done their best to meet the desires of their organized employes in their own preferences. Those employes know just as well as their employers that if they do not join an A. F. of L. union, the product of their labor can not be sold in a market unionized by the A. F. of L. building trades.

There are plenty of employers who really prefer the C. I. O. scheme of vertical unions. It means in most cases that the employes of their plants would be local units, and the employers would deal with them as units and with labor leaders who know or could understand local conditions. It is certainly inconvenient, to say the least, to have to deal with four or five union agents where a plant may employ but 25 or 30 men. And those union agents usually come from the city and have little understanding of, or interest in, the problems of these few union members out in the sticks.

Few, if any, employers now dispute the justice of the theory of collective bargaining. But they certainly see red when they attempt to discuss the National Labor Relations Board's supervision of it. We can't help believing that a great majority of employes see eye-to-eye with their employers in this matter. Consequently it is poor politics on the part of New Dealers not to face frankly this festering sore of the industrial body and meet the issue honestly and fearlessly.

Nathan C. Rockwood

Unusual Gravel Operation in an Unusual Deposit

Wide Variation in Percentage of Sand and Gravel Sizes Require Interesting Layout and Dredge Equipment

By BROR NORDBERG

When Gifford-Hill and Co., Inc., Dallas, Texas, purchased the plant of the Riverside Gravel Co., Minden, La., in August, a year ago, it was remodeled and a method of operation was devised to provide a relatively large capacity of washed gravel in spite of deposit limitations.

At this plant four dredge boats are operated, and at times material is pumped through three separate pipelines to the one screening plant. The plant is capable of producing washed ballast and commercial gravel simultaneously with pea gravel and sand. All four grades of materials can be loaded into railroad cars at one time without the use of bin storage.

By deposit limitations is meant a low percentage of metal—probably about 35 percent, and there is great variance in its occurrence throughout the deposit. In a given pumping location, there may be practically all sand, while in another there is a greater percentage of gravel. Also, within the limits of the deposit, there is considerable variation in gravel size and in the overburden to be handled.

Store Excess Material Under Water

Overburden averages 15 ft. in depth, and the gravel bed varies from 5 to 12 ft. in thickness. Probably 95 to 97 percent of all recoverable gravel will pass a screen with 1½-in. openings.

Despite these wide differences the deposit is being worked, not according to the occurrence of gravel, but along a regular bank, pumping all material including overburden as it is encountered so that no "islands" of material will be left in the lake.

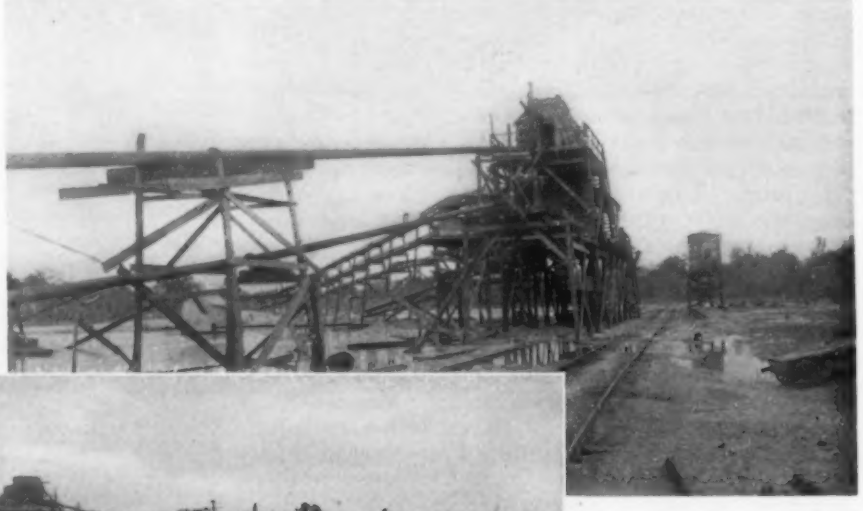
This, of course, necessitates handling much material in excess of that to be shipped and requires some provision to level out the highs and lows of production. To take care of this situation, excess material is stored under water near the screening plant and is rehandled by pump through the plant independent of the dredge boats operating at the bank.

Present bank pumping operations are about 600 ft. from the plant. When production started in 1937, two dredge boats pumped material directly to the screening plant in producing washed bank run ballast, and a third boat pumped concrete gravel and sand over a separate sizing screen.

Intermediate De-sanding Plant Reduces Pumping Distance

Pumping over a distance of 600 ft. was too great for economical operation so an intermediate de-sanding plant was erected 250 ft. from the screening plant. Generally two dredge boats pump to this intermediate plant to produce the required amount of gravel.

Two of the dredge boats have 8-in. electrically-driven Amsco pumps, a third has a 10-in. pump driven by a 200-hp. Fairbanks-Morse Diesel engine, and the fourth is an entirely new, all-



Right: Rebuilt plant showing three launders to handle waste from two or three pumps delivering material to the plant simultaneously

Left: Note two pipelines entering separate discharge boxes, and the three waste flumes needed for capacity operation

Below: Desanding plant where a separation is made and the screen oversize gravel contains needed sand for ballast. To the right may be seen the sand settling box

Above: Horizontal screen for sizing concrete aggregates

steel, electrically-driven boat of modern design.

This boat is 60- x 30-ft. in plan, and is floated by pontoons built from seven 8000 gal. oil tank cars. The pump is a 10-in. Diamond dredge pump (made by Pettibone-Mulliken Corp., Chicago, Ill.), with a 12-in. suction and 10-in. discharge, driven through Texrope drive by a 250-hp. G. E. electric motor operating at 545 r.p.m.

To loosen the material at the head of the suction pipe, the boat is equipped with a 30-ft. Pettibone-Mulliken "Diamond" cutter. The cutter is driven through reduction gears by a 20-hp. Allis-Chalmers slip-ring motor with flat belt drive. The Clyde 3-drum hoist is powered by a 15-hp. U. S. squirrel cage motor through Texrope drive.

Discharge from this pump and one of the other electrically-driven 8-in. pumps is to the de-sanding plant, each pipeline discharging to a wood box over the stationary screen. The box is partitioned, one side for each pump, so that the discharge from one pump cannot choke the pipeline from the second boat should only one pump be in operation.

How the De-sanding Plant Operates

Although the de-sanding plant was installed mainly to reduce the pumping head on each pump, some control is also exercised over the finenesses of sand recovered for later handling through the main plant.

This intermediate wood structure has been built on the bank next to the lake and 350 ft. closer to the sizing plant than the pumps operating in the bank. An incomplete split of sand and gravel is made over a stationary 12-ft. sq. screen in this unit. The screen has ¼-in. sq. openings.

The screen has a slope of 6 in. to the foot, and the flow of material from the discharge box above is retarded by three successive wood baffles over the screen to such a degree that a desired part of the sand is retained in the plus ¼-in. material passing over the screen cloth. By proper adjustment of the screen slope and baffles, the approximate desired percentage of sand (20 percent) required in washed bank run railroad ballast is retained in the gravel which runs over the screen and into storage back into the lake.

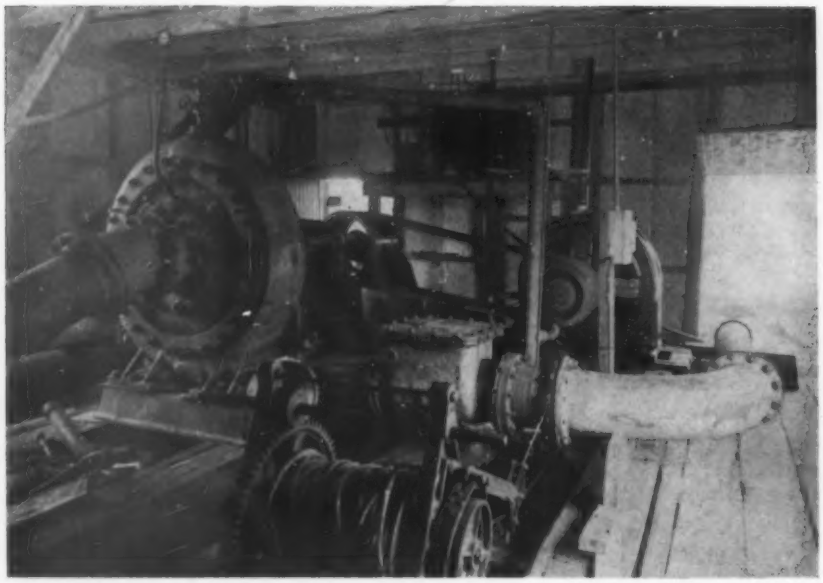
Throughs from this screen (sand) are laundered through a 24-in. flume back into the lake in a direction at right angle to the gravel run off from the screen. About 30 ft. from the screen, a wood sand settling box has been built to the width of the flume, 12 ft. long in the direction of the flume, and 8-ft. deep. The flume has a drop of 1 in. to the foot and the sand box has no screen cloth over it—the velocity of the water and the slope governing the fines which will be trapped.

Dredge cutter in raised position. Screening plant is in the background

Sand is released to lake storage from the settling box through a 6-in. round opening in the bottom. A hand-operated slide gate is used to close or open the outlet, either completely or partially. In operation, the opening has sufficient area to release sand into the lake as fast as it settles, in which case a good percentage of fines is retained with the coarse sand, or the discharge opening may be closed completely until the box is entirely filled and then released. In the latter case, a coarser product will be recovered. Similarly, the opening can be partially shut off during operation of the pumps.

By the use of the de-sanding plant, there is always available a supply of gravel, containing the approximate requirement of sand for ballast, and also a stack of sand. Both are close enough to each other so that a third dredge boat can pump either or both or a mixture of sand and gravel to the screening plant.

The screening plant itself is unusual in that ballast and commercial gravel are produced either separately or simultaneously and, as mentioned previously, the output of three pumps may



Interior of new dredge showing pump driven by an electric motor through V-belt drive

be easily handled at the same time.

This is done by operating a separate screening surface for each of the two desired products and by having the discharge from each pump enter a separate discharge box above the screens. If only ballast material is being run, it is pumped from the under-water storage pile that has been passed through the de-sanding plant. This material goes to one of the discharge boxes and passes over a 12- x 12-ft. inclined stationary screen with ¼-in. sq. openings.

Plus ¼-in. material goes direct by chute into cars. The water and fines coming through the upper half of the screening surface are run through a flume which has a sand settling box covered with 10-mesh cloth. A majority of the fines are trapped here since the greatest percentage of fines passes through the stationary screen openings near the top of the screen in coming from the pump discharge box. The overflow from the settling box goes back into the lake.

Similarly, the throughs from the lower half of the same screen are flumed to waste and a coarser product is caught in a sand settling box. This coarse sand is used in ballast and is chuted directly from the settling box into the ballast car to mix with the plus ¼-in. material.

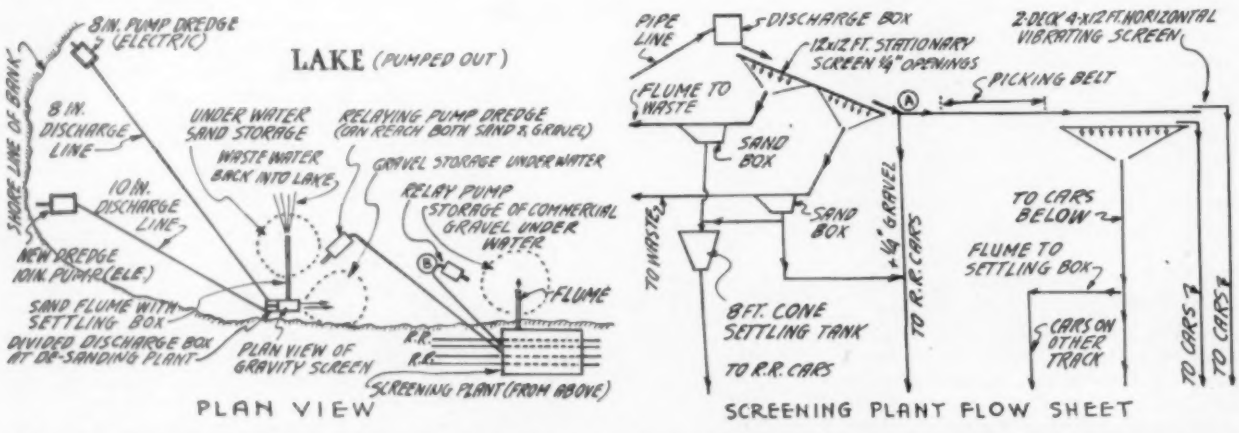
Other grades of sand are produced by mixing various amounts of sand drawn from each settling box in an 8-ft. cone settling tank, which has an automatic discharge controlled by a weight. The cone is set directly below the two sand boxes and discharges directly into cars. Water is added in the cone through a section of 2-in. pipe.

If it is desired to stock aggregates which may later be made into commercial material, a trap door is opened and all plus ¼-in. material is diverted through a flume into the lake adjacent to the plant. This material is then pumped by another dredge boat to the screen, where plus ¼-in. material, instead of discharging to cars, passes over a 30-in. conveyor belt (14-ft. centers) to the final washing and sizing screen. This conveyor is a picking belt, all trash being dumped into a flume and water added at the head of the flume to wash it to waste.

Final sizing of commercial gravel is done over a 4- x 12-ft. double-deck Cedar Rapids Symons screen which operates horizontally. Sized gravel goes directly into cars, and minus ¼-in. material through the lower screen deck may go directly to a car below or be trapped in a flume settling box for delivery to a car on the other railroad siding. Generally, all commercial stone is sized from material that has been pumped three times to get the maximum in washing and scrubbing action.

In producing ballast and commercial gravel simultaneously, two stationary screens are used, one over the other, each receiving its material from a different pump. The ballast is chuted to cars while the plus ¼-in. gravel from the other screen deck is then passed over the horizontal vibrating screen.

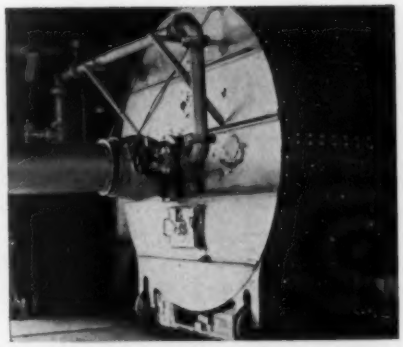
At one time two dredge boats pumped ballast material directly to one gravity screen, and a third handled commercial gravel to the second screen. When operating two dredge boats on commercial and ballast material, the plant has a capacity of about 30 cars of washed gravel in 10 hr. Shipments are made on the L. and A. railroad.



Left: Plan view. Right: Flow diagram showing typical operation in producing aggregates and ballast. In producing ballast only, the flow is to the left of point (A), with all plus material going to cars. In producing commercial stone, plus ¼-in. at (A) goes on to the picking belt and vibrating screen. In producing both commercial aggregates and ballast simultaneously, the same flow sheet applies with the addition of a second 12- x 12-ft. gravity screen installed directly over the other. Plus ¼-in. material retained on one screen follows the route to railroad cars as ballast; material on the other screen is by-passed to the picking belt (commercial) and rescreened.

Making Portland Cement The Year Round

800-bbl. Plant Eliminates Seasonal Shut-Downs



Kiln hood showing natural gas burner

Designed for a daily capacity of only 800 bbl., the new plant of the Gulf Portland Cement Co., Houston, Texas, turned out its first standard portland cement clinker on March 21, 14 months after plant construction started. A great deal of interest has been aroused among cement plant officials in the construction and operating details of the only cement plant built in the United States during the past year.

Although the plant is relatively small compared with others, it is anticipated by company officials that demand for the product will warrant full operation of the plant without idleness of large capital investment and that much will be gained in operating efficiency by keeping a smaller force of skilled workmen employed continuously.

Briefly, it is a wet process plant, oyster shells and clay making up the raw materials, and the kiln is fired by natural gas. Closed-circuit grinding is employed throughout—in the raw mill as well as for grinding cement clinker.

Oyster shells from Galveston Bay are purchased from a commercial producer and are delivered in 300-cu. yd. barges f.o.b. the company's dock. The average analysis of the washed shell is as follows:

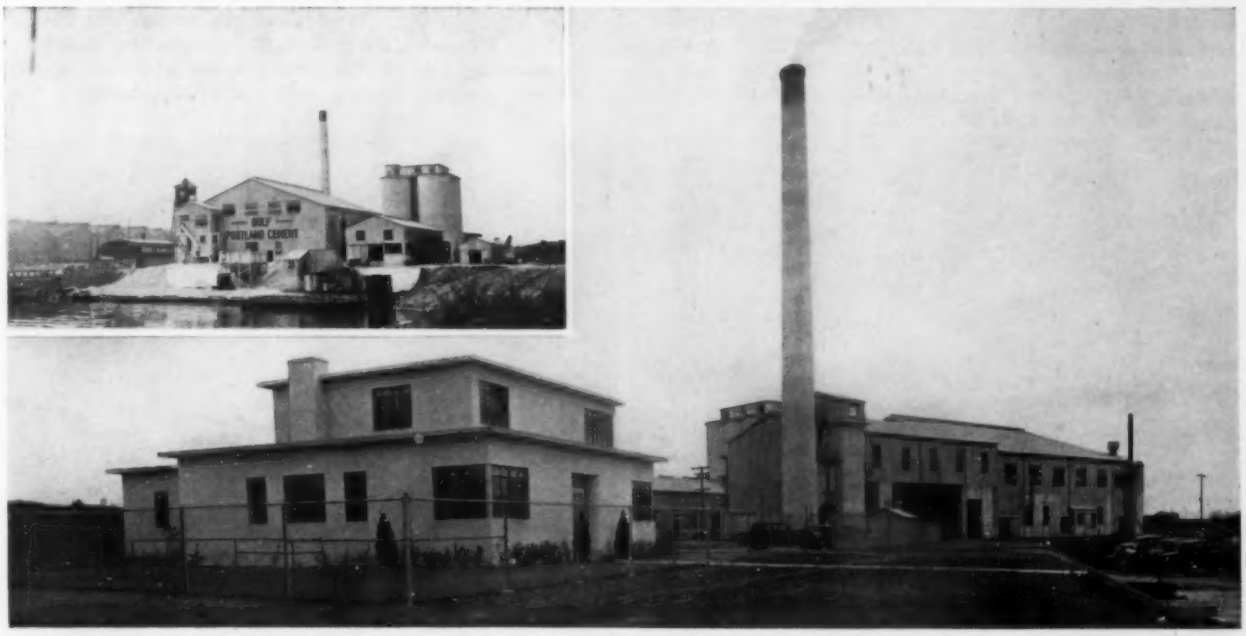
S_iO_2	1.50 percent
R_2O_3	.50 percent
CaO	53.80 percent
MgO	.25 percent
Loss	43.21 percent

The clay is also delivered by barge and has the following average analysis:

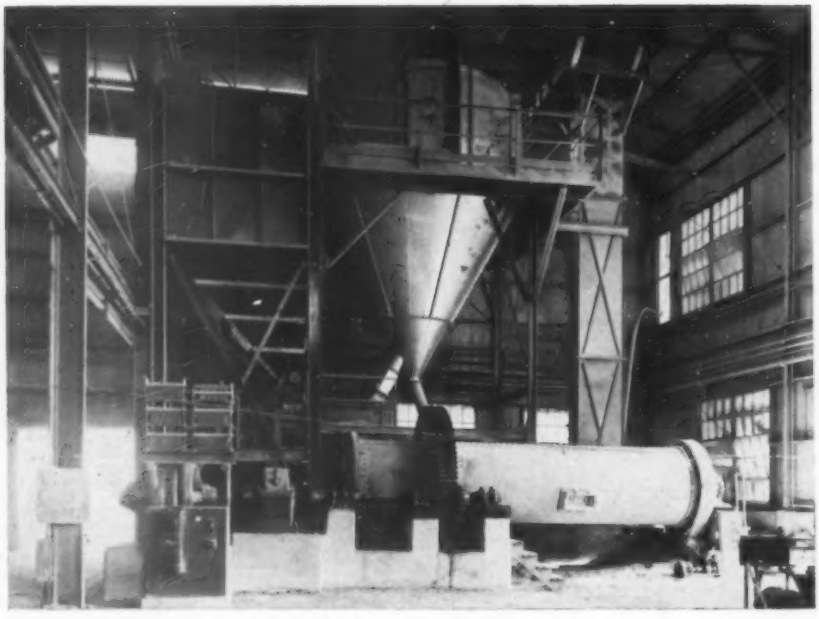
S_iO_2	51.00 percent
Fe_2O_3	5.25 percent
Al_2O_3	15.00 percent
CaO	10.00 percent
MgO	2.50 percent
Loss	15.10 percent

At the dock, a yard crane places the oyster shells in storage or directly into a 300-cu. yd. bin, under which is a tunnel belt conveyor (14-in. belt) for reclaiming the shell and delivering it to the raw grinding mill. The shell is screened as the barges are loaded to reject sizes over 1½-in. The clay is similarly handled and stored on the dock near the wash mill. In the 16-ft. diameter wash mill, water is added to the clay and after thorough mixing, the clay slip, containing 55 to 60 percent water, is pumped to the clay storage tank in the mill building by a 2-in. Wilfley slurry pump. This concrete tank is 20 ft. high with a 13½-ft. inside diameter. The shell reclaimed from the dock storage bin is placed by a 45-ft. Jeffrey chain bucket elevator into a 50-cu. yd. steel bin over the preliminary ball mill.

Raw grinding equipment consists of a 7- x 9-ft. ball mill for the preliminary grind, a 4- x 7-ft. single-deck Jeffrey-Traylor electrically vibrated screen, and a 7- x 22-ft. tube mill. As a general practice, only the oyster shells are passed through the ball mill, most of



General view of cement mill which is of reinforced concrete construction with welded, structural steel. The office building, to the left, is a modern, monolithic concrete building. Inset, above: View of plant from ship channel, showing shell and clay storage and 10-ft. cone collector for precipitating dust from air preheated in passage through clinker cooler



Two finish mills operating in closed-circuit wtih a 14-ft. air separator. Fines are pumped to storage silos and the rejects are divided equally back into the mills

the clay being 200-mesh product when delivered to the plant.

The ball mill operates in closed-circuit with the vibrating screen. It is fed shell over a No. 4 Jeffrey-Traylor vibrating feeder, the feed containing about 36 percent water, which includes the water introduced to wash the screen rejects back into the ball mill. The ball mill, charged with 15 tons of 3-in. minus steel balls, turns at 20½ r.p.m. It is driven by a 200-hp. motor through a Philadelphia herringbone gear reducer with a reduction of 3.8:1.

This mill discharges to a sump box, the product being pumped to the vibrating screen, having 14-mesh cloth, by a 2-in. Wilfley slurry pump. The circulating load handled by the ball mill is 200 percent. This is a ratio of 120 bbl. of circulating product per hour entering the ball mill against a finished product of 60 bbl. per hr. with a feed of 60 bbl. per hr. Rejects return and enter the ball mill (center feed) with the fresh feed, the fines from the screen entering the tube mill feed tank (15- x 13½-ft. diameter).

Proportioning the Raw Materials

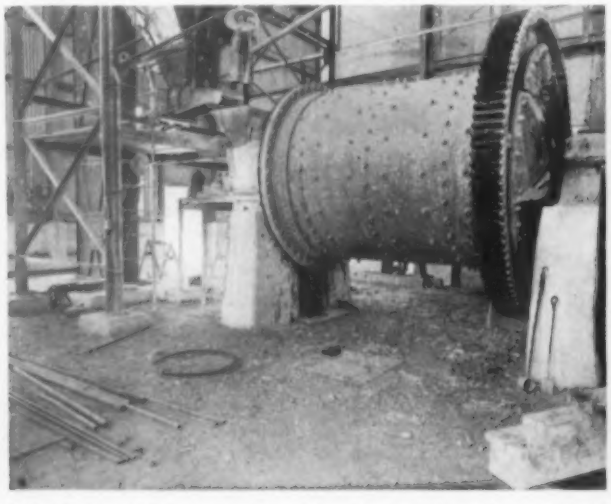
The clay slip can be passed through the ball mill, but it is generally put through the tube mill without preliminary grinding. The feed to the tube mill is regulated by means of variable speed Kennedy ferris wheel feeders (for shell and clay separately), the two materials being pumped to the feeders by 2-in. Wilfley slurry pumps, with the feeder overflows returning to the storage tanks.

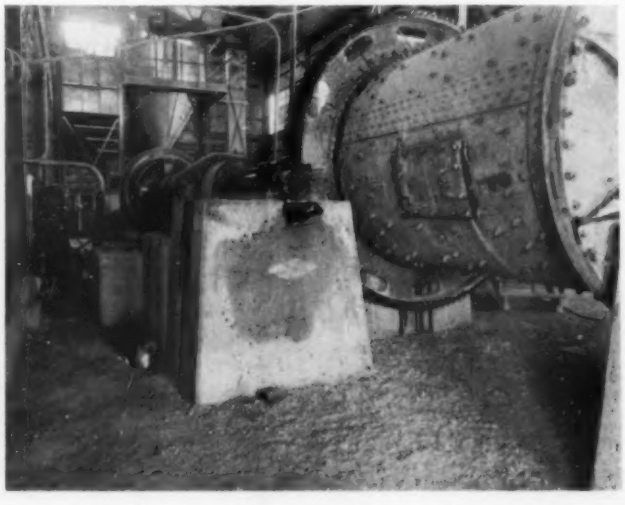
The 7- x 22-ft. tube mill, charged with 35 tons of ⅞-in. and ⅝-in. steel balls, has a revolving speed of 23 r.p.m. and produces 60 bbl. of raw material per hr. with a fineness of 92 percent minus the 200-mesh sieve. The mill drive is a 400-hp. slip ring motor through a Philadelphia herringbone gear reducer with a reduction of 8.1:1. The tube mill product is pumped to storage by a 2-in. Wilfley pump.

Storage of Kiln Feed and Blending

Within the mill building are three storage tanks and two blending tanks, each of reinforced concrete construction, 13½ ft. in diameter and 20 ft. high, in addition to a large concrete tank for storage of kiln feed. Three Wilfley 2-in. slurry pumps under the tanks are connected to give flexibility to the system—to enable the handling of slurry from either storage tank to either blending tank or to the kiln feed storage direct. The tanks have conical bottoms, direct-connected to the pumps below, and can be completely emptied.

Slurry is pumped from the kiln feed storage tank by a 2-in. Wilfley slurry pump to a Kennedy ferris wheel feeder at the feed end of the kiln. The overflow from the kiln ferris wheel feeder returns to the kiln feed storage through a pipe line. The moisture content of the slurry when it is fed into the kiln averages approximately 42 percent.

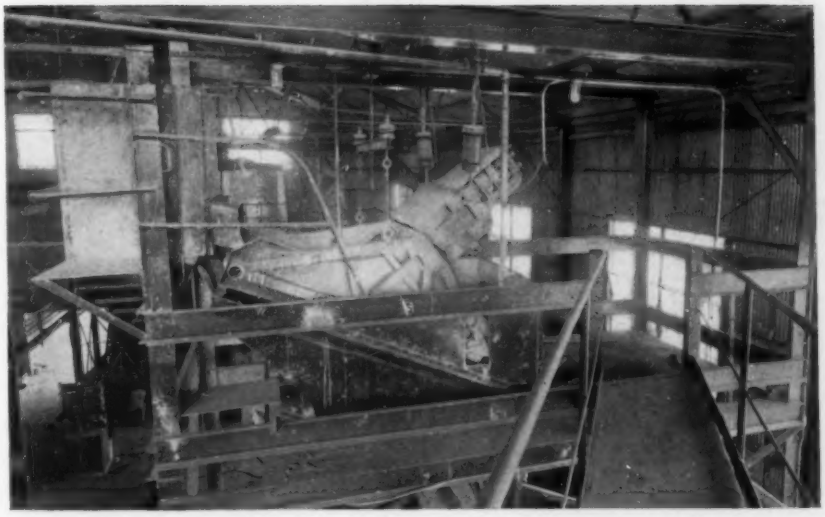




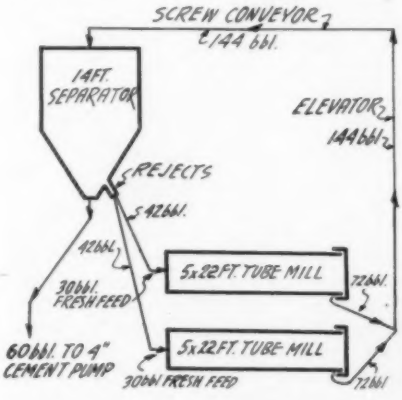
Left: Oyster shells are ground wet in a ball mill, the discharge being pumped from the sump on the right over an electric vibrating screen. Note pipe at the feed end of the mill through which tailings return to the mill. Fresh feed enters the mill over an electric vibrating feeder under the mill hopper. Right: Ball mill drive with air separator for the finish mill shown in the background

The plant has one kiln, 8 ft. in diameter by 220 ft. in length made from two kiln shells, and a 6- x 120-ft. rotary cooler. For a length of 70 ft. in the burning zone of the kiln, it is lined with 6-in., 70 percent alumina Mexico refractory brick, the other 150 ft. of length being lined with 4½-in. cold zone brick. The kiln has a slope of ⅜-in. to the foot, and is driven at two points by two 40-hp. synchronized variable speed motors. Maximum kiln speed is one revolution in 55 seconds, the speed being synchronized with that of the ferris wheel feeder placing slurry into the kiln. The kiln is also equipped with a 60-ft. section of chains.

Natural gas is used in firing the kiln through a 17-in. Tate-Jones burner, modified to suit special burning conditions. The average fuel consumption on the first week's run of clinker was about 1500-cu. ft. of gas per bbl. of cement. Kiln conditions are regulated through automatic draft control and heat recorders, and the kiln exhausts through a reinforced concrete stack 165 ft. high.



Electric vibrating screen operating in closed-circuit with the ball mill for preliminary grinding of shells. Throughs are fed to the tube mill along with the clay slip, the tailings being returned to the ball mill



Flow sheet of the finish grinding

Air for combustion is pre-heated from 400 deg. F. to 500 deg. F., and introduced at the burner by drawing air at room temperature through the rotary cooler with an American blower fan of 20,000-cu. ft. rated capacity—dust being precipitated in a Raymond 8-ft. diameter dust trap.

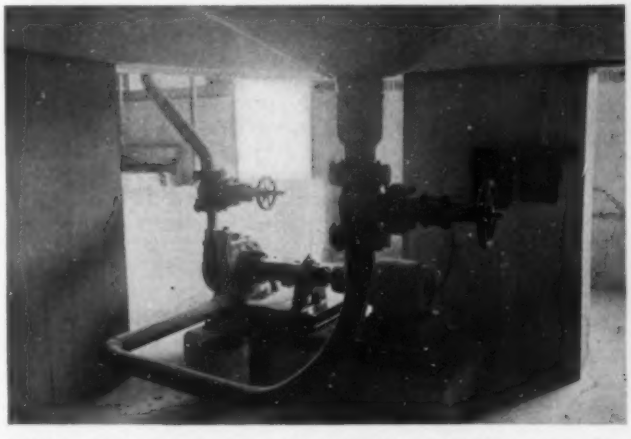
The rotary cooler is lined with 4½-in. cooler block for the first 60 ft. of its length, and is typical in design with internal "lifters" to cascade the clinker as it passes through the cooler. The pitch of the cooler is ½-in. to the foot, and it revolves at 1½ r.p.m. At the point where the clinker leaves the cooler block, the cooler is spray-cooled for 15 ft. of its length.

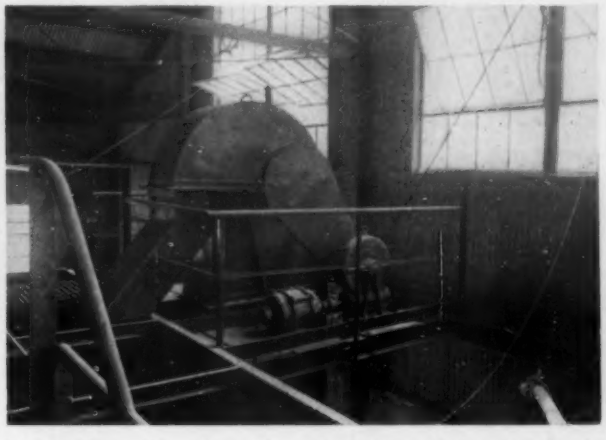
From this point on, the plant design is for a straight-line flow passage of clinker through the clinker grinding mills or clinker may be placed in storage and later reclaimed for grinding. The cooler discharges to a short 6-in. Jeffrey drag chain conveyor and then to boot of a Jeffrey chain bucket elevator.

The elevator discharge may go direct to another 6-in. drag conveyor which places clinker into storage or the clinker may be diverted for direct passage through the preliminary grinding mill. Storage is provided, under cover, for 15,000 bbl. of clinker. From storage, clinker is reclaimed for grinding by the same drag conveyor which placed it into storage. Gypsum is stored in a 13½- x 30-ft. cylindrical tank adjacent to the clinker storage, one Jeffrey chain bucket elevator serving to place gypsum into storage as well as reclaiming it for feed to the grinding mill.

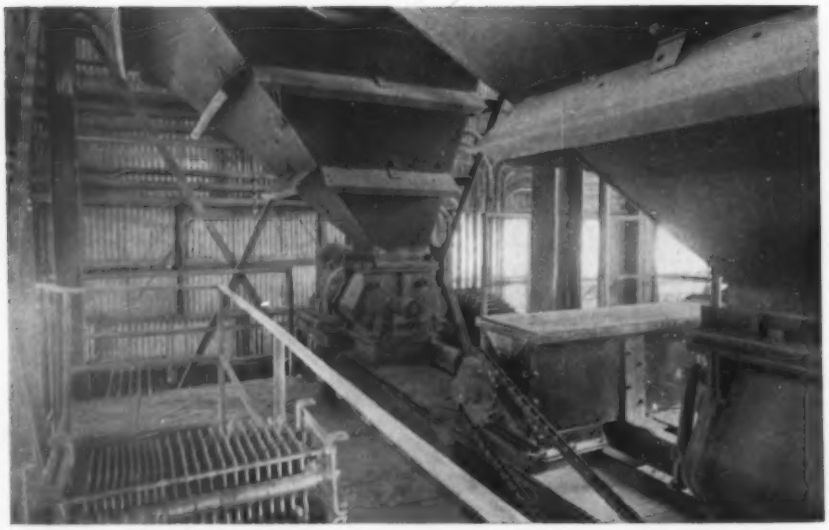
Grinding Clinker

Gypsum and clinker feeds to the No. 85 kominuter are regulated by two Jeffrey-Traylor "Waytrol" vibrating feeders. The kominuter is driven at 20½ r.p.m. by a 150-hp. motor through a Philadelphia herringbone gear reducer with a reduction of 4.1:1. The

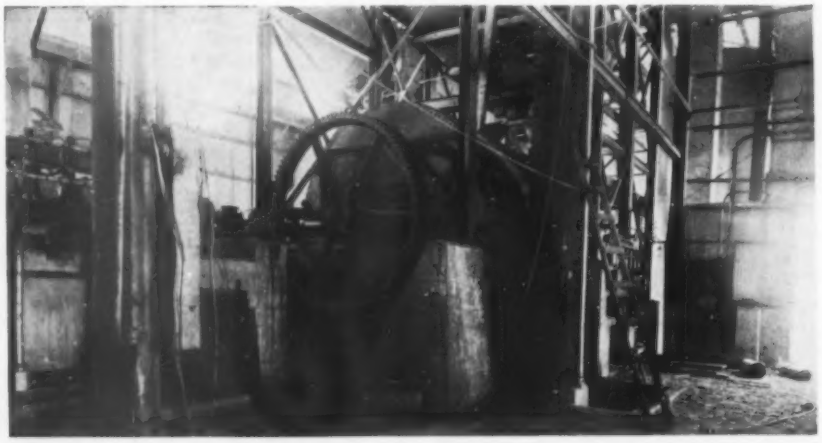




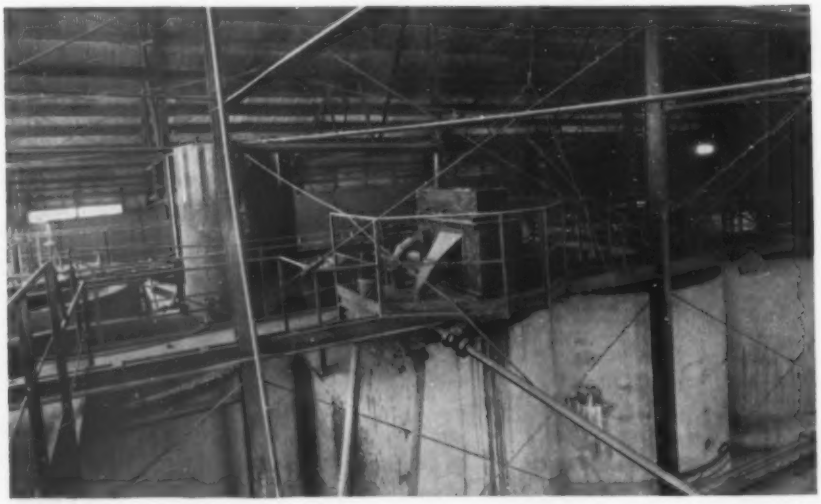
Left: One of several pumps used throughout the plant for handling clay slip and slurry. Note, above, the conical bottom of the concrete silo. Right: Head of the elevator placing shells in the ball mill feed bin



Rotary feeders which feed the finish tube mills. Rejects from the air separator, in closed circuit with the tube mills, are returned through the screw conveyor in the center and divided equally into each mill



Kominuter for the preliminary grinding of clinker is in closed circuit with an electrically-vibrated screen



Ferris wheel feeder, in center, where control is exercised in the feed of clay slip into the tube mill in which it is ground along with the shell. Below the feeder may be seen the clay slip and slurry silos

grinding media are six tons of steel balls with a top size of 5-in. diameter.

The kominuter discharge is in closed-circuit with a 4- x 7-ft. Jeffrey-Traylor vibrating screen, with 18-mesh screen cloth. Fines from the screen are conveyed (by 12-in. screw conveyor) to the tube mill bins for the final grinding. Tailings return and enter the kominuter with the fresh clinker feed. The circulating load is 200 percent, representing a ratio of 120-bbl. per hour entering the kominuter to an output of 60 bbl. per hr. from the kominuter.

Air Separation and Tube Mills

The final grinding is done by two 5- x 22-ft. tube mills, operating in closed-circuit with a 14-ft. Raymond air separator. The separator has a double set of "whizzers," and is the type recommended by the manufacturer for high specific surface grinding.

Tube mills have a center feed and discharge peripherally to a Jeffrey chain bucket elevator which delivers the products (from both mills) to a screw conveyor feeding the air separator. Each tube mill, charged with 15 tons of 1¼-in. Concavex grinding media, is driven at 29 r.p.m. by a 200-hp. motor through a Philadelphia herringbone gear reducer with a reduction of 3:1.

Each tube mill is fed by a separate Fuller No. 2 rotary feeder, driven by a 2-hp. Reeves variable-speed motor and discharges into a screw conveyor that also carries the tailings to each mill. Fines (finished cement) from the separator are pumped into the cement storage silos by a 4-in. Fuller-Kinyon pump. The separator tailings are split equally and added to the fresh tube mill feeds by left and right screw conveyors. Capacity of the system is 60 bbl. of standard portland cement per hour with a circulating load of 240 percent, as illustrated with approximate figures in the accompanying diagram.

Handling of Cement

Total storage is 35,000 bbl. of standard cement in four silos, one star bin and three pocket bins. Storage differs from other plants in the method of reclaiming for shipment or for bagging cement. A 6-in. Fuller-Kinyon portable cement pump is readily connected to flange fittings beneath either bin or silo for the removal of cement and placement in bulk in cars for shipment.

The same unit serves to transfer cement from any storage unit to another or to fill the 150-bbl. packing machine bin in filling orders for sacked cement. Sacked "Gulf" cement is packed by a 3-spout Bates bagging machine. Space has been allowed for in the packhouse building for installation of a second packer at a future date. "Gulf" cement,

as it has been trademarked, is shipped outside the Houston territory on the Southern Pacific railway.

Electrical power for operation of the plant is purchased by the company and distributed through its own sub-station, where the potential is reduced to 440 volts by three 3-phase, 60-cycle, 667 kv.a. transformers. In the sub-station is a complete 12-panel board with controls, switches, ammeters, voltmeters, power meters; a 600-cu. ft. Ingersoll-Rand air compressor; and a 200-cu. ft. Chicago Pneumatic compressor to furnish plant requirements.

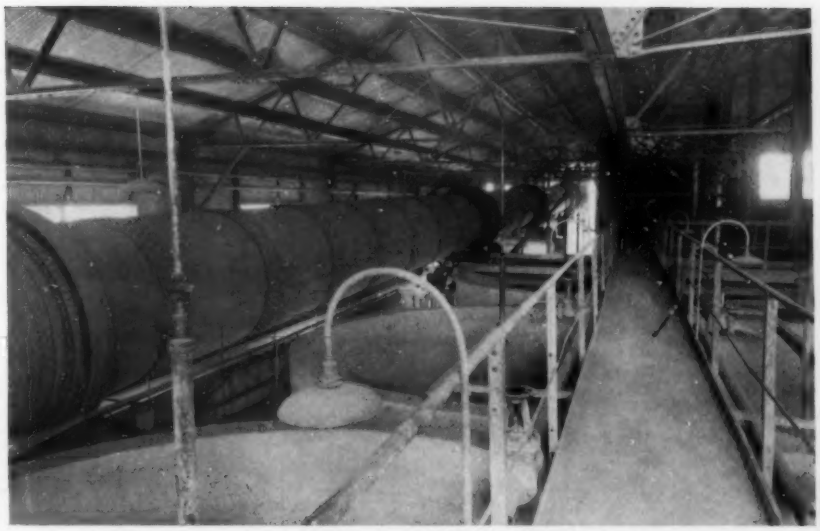
The plant has a complete machine shop which was put into operation long before the cement plant was completed so that much of the structural work could be done with company labor and equipment. All herringbone gears in use throughout the plant were furnished by the Philadelphia Gear Works and the worm gears driving elevators and other of the smaller equipment were furnished by the D. O. James Manufacturing Co., Chicago, Ill. Elevators, conveyors, feeders and drag chains were manufactured by the Jeffrey Manufacturing Co., Columbus, Ohio. Bin-dicators have been installed on all bins to indicate the level of cement in storage. The total connected electrical power on the plant is 1800 hp.

The entire plant is of reinforced concrete with welded, structural steel, and welded galvanized iron construction. Sales offices, production offices and executive offices are at the plant in a new, modern monolithic concrete office building, which will be air-conditioned. In this building are the laboratories for physical testing and chemical control of the cement quality.

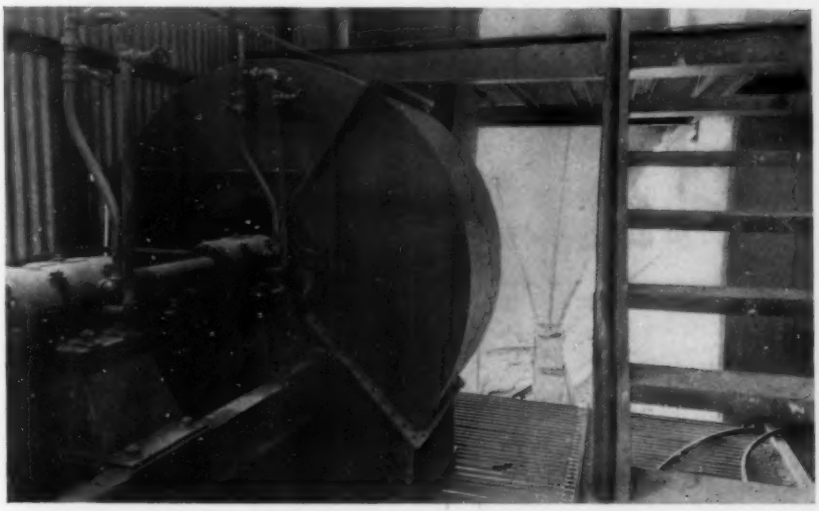
Chemical Laboratory

Latest devices in testing and analytical equipment are installed in the laboratory. Apparatus used includes: a Shapco atmospheric cabinet, manufactured by the Sodemann Heat and Power Co., St. Louis, Mo., for the storage of cubes and briquettes; a Southwork-Emery 75,000-lb. capacity compression machine for the testing of 2-in. cubes (plastic mortar test) and 3- x 6-in. concrete cylinders; an Olsen testing machine for briquettes; a Wagner turbidimeter; a Cenco-Menzel autoclave manufactured by the Central Scientific Co., Chicago, Ill. Other minor equipment includes the conventional gas and electric appliances, steel tables, sinks, etc.

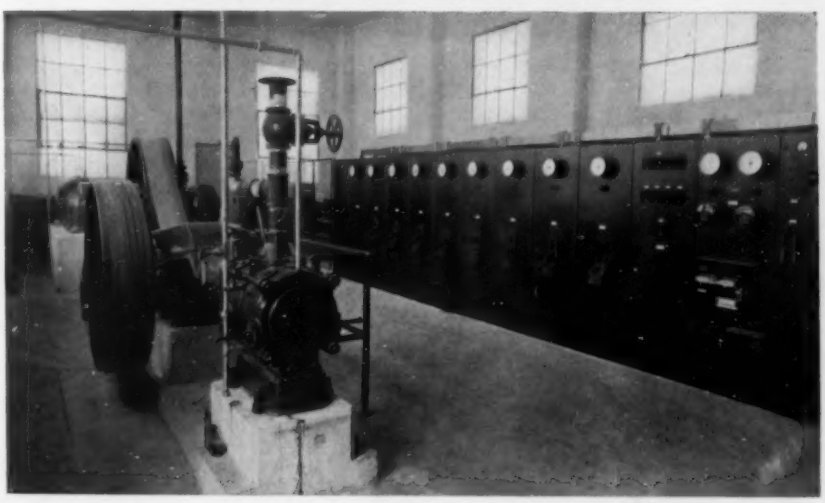
This completes the general description of the cement manufacturing process. Some minor changes will necessarily occur, as experience is gained, particularly with reference to some of the figures given. However, it is interesting to study the test data which



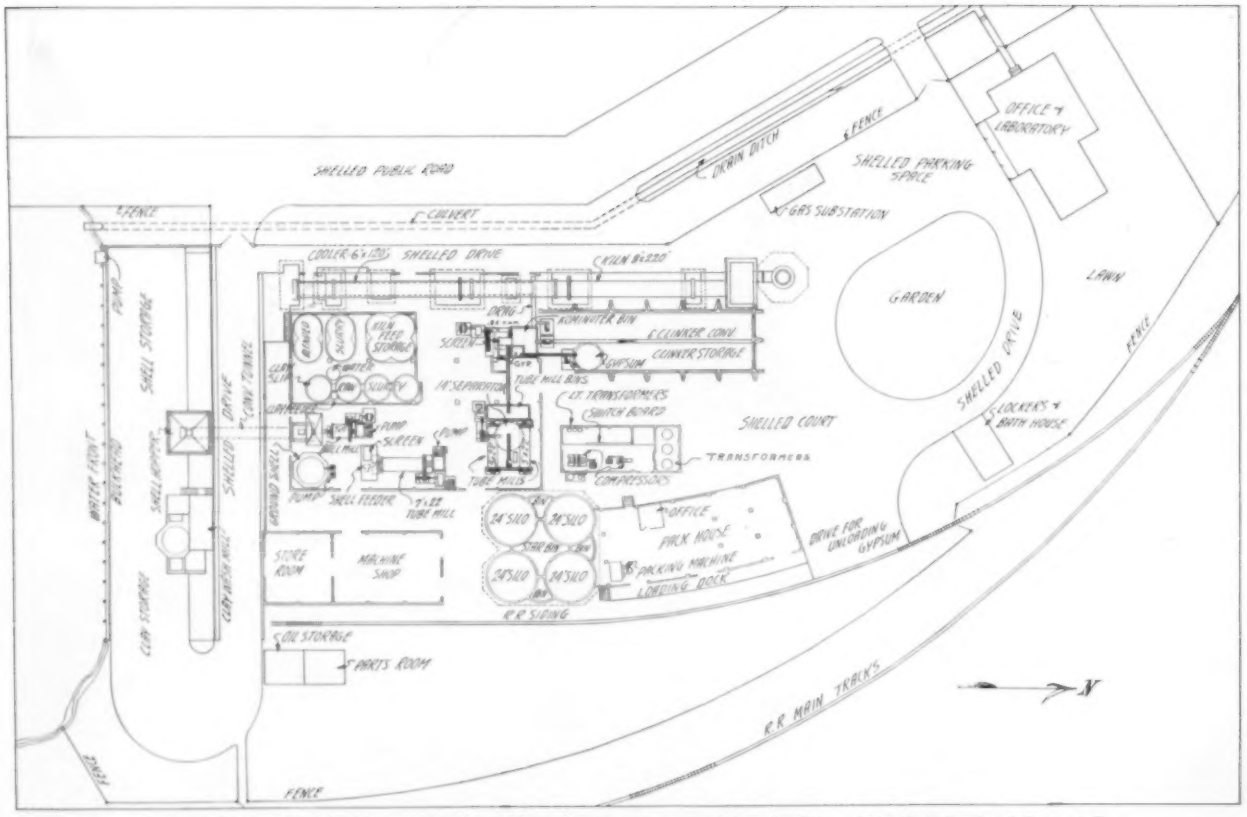
Looking toward the feed end of the kiln. In the foreground are the slurry silos



Air is drawn by 20,000 cu. ft. fan through the clinker cooler where it is preheated before entering the kiln. Dust trap is shown in the background



Substation and compressor building. On the left are two air compressors, and on the right, a 12-panel board for electrical control of the entire plant



Layout of cement mill, storage capacity, office, shop, and transportation facilities of the Gulf Portland Cement Co.

were compiled, based on the first month's operation of the new plant.

Cement Data

The average cement analysis obtained for this period is as follows:

SiO_2	21.60 percent
Fe_2O_3	2.30 percent
Al_2O_3	5.60 percent
CaO	65.80 percent
MgO	1.50 percent
SO_3	1.90 percent
Loss	1.00 percent
Free lime	1.20 percent

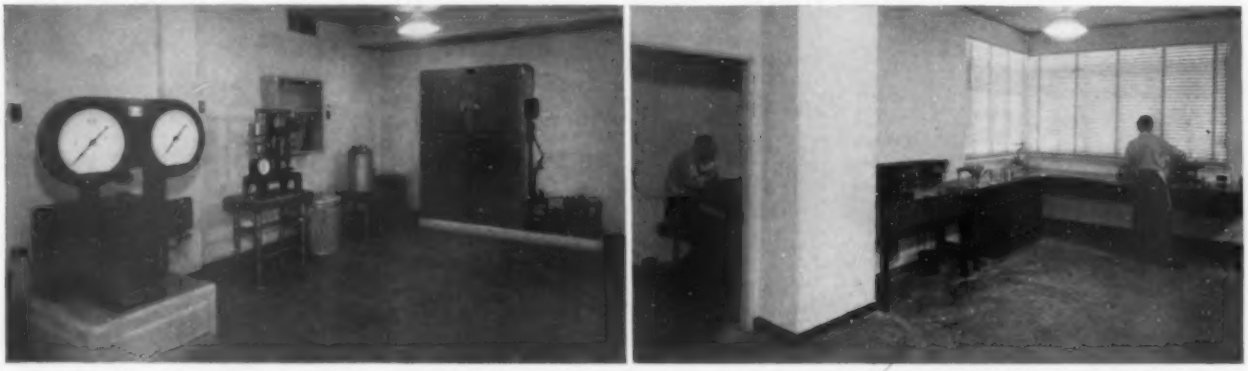
Some variation is to be expected in grinding practice as experience is gained, but specific surfaces of the cement first manufactured averages 1950 cm^2 per gram. The initial set took place in two hours 30 minutes and the final set occurred in five hours. Soundness was satisfactory and strengths of test specimens were as below:

Days	Tensile	Compression Plastic Mortar
1	180	1100
3	350	2600
7	425	4000
28	480	6100

Personnel

Executive and operating personnel of the company are headed by men who have had considerable previous experience in the manufacture and sale of portland cement. Kent B. Diehl, Houston, Texas, president and general manager of the company, is a graduate engineer and former cement salesman. F. M. Corzelius, Houston, is vice-president; Dan J. Morse, Houston, traffic manager; R. L. Shaw, Fort Worth, treasurer.

Thomas B. Douglas, as secretary, works manager and chief engineer and Geoff A. Saeger, chief chemist and chemical engineer are in charge of operations. Mr. Douglas was formerly technical engineer for the Dewey Portland Cement Co., Kansas City, Mo., and Mr. Saeger is well known through his past connections in the cement industry and the Bureau of Mines in Washington, D. C.



Views taken in cement plant laboratory. Equipment includes a 75,000-lb. capacity compression testing machine for making the plastic mortar test, a testing machine for briquettes, a turbidimeter, an autoclave, atmospheric cabinet, and other miscellaneous apparatus

Meeting The Demand For Finely Pulverized Stone

By BROR NORDBERG

Development of new uses for stone products has brought about an expansion in plant facilities at Forest, Ohio where the Herzog Lime and Stone Co., operates a large quarry and lime plant.

When the quarry was first opened, kiln stone and flux stone were the principal products. In 1929, a second large screening unit, entirely separate from the first plant, was built to size commercial stone. The feed for this screening unit is the undersize from the first plant and is received over a gallery conveyor. A description of this unit appeared in ROCK PRODUCTS, December 7, 1929, pp. 61-67.

To meet the demand for fine stone products, a third plant was built and placed in operation in July, 1937. This unit is also designed so that the feed may be taken from the screenings of the preceding units and from the big stockpiles of minus ¼-in. stone built up over a period of years. The capacity of the main stone plants is 300 tons per hour, of which 20 percent is the minus ¼-in. product separated into fine stone gradings in the new plant.

Equipment in this new plant comprises a belt conveyor for reclaiming ¼-in. minus stone, a natural gas-fired dryer, storage and screening plant for sized fine stone, and a pulverizing department where extreme fines are produced and sacked.

Most of the feed to the new plant is from accumulated stockpiles of screenings which are loaded into railroad cars by a clamshell and placed over the tunnel housing the belt conveyor that feeds the dryer. The stockpile over the conveyor feeds by gravity to the belt through three sloping steel hoppers.

Electric Vibrator on Hoppers Eliminates Moisture Troubles

Moisture in the screenings varies from 6 to 10 percent. Considerable difficulty was experienced, at first, in getting the stone to flow freely by gravity to the belt, especially when the moisture content was high.

This condition was corrected by installing a Tyler Ty-Speed electric vibrator on each hopper near the point of discharge to the belt. With a constant high-speed pulsation in a direction perpendicular to the hopper side plate there has been no difficulty in getting a uniform feed, even when the screenings contain as much as 10 percent moisture.

As the moisture content of the screenings ordinarily varies from 6 to 10 percent, in extremely wet weather ⅛ to ¼-in. stone is occasionally taken from bins in screening plant No. 2 and placed over the tunnel by a swinging belt conveyor. The reclaiming conveyor, on 145-ft. centers, has 18-in. belting, and discharges through a steel chute into a 5- x 30-ft. Bonnot dryer.

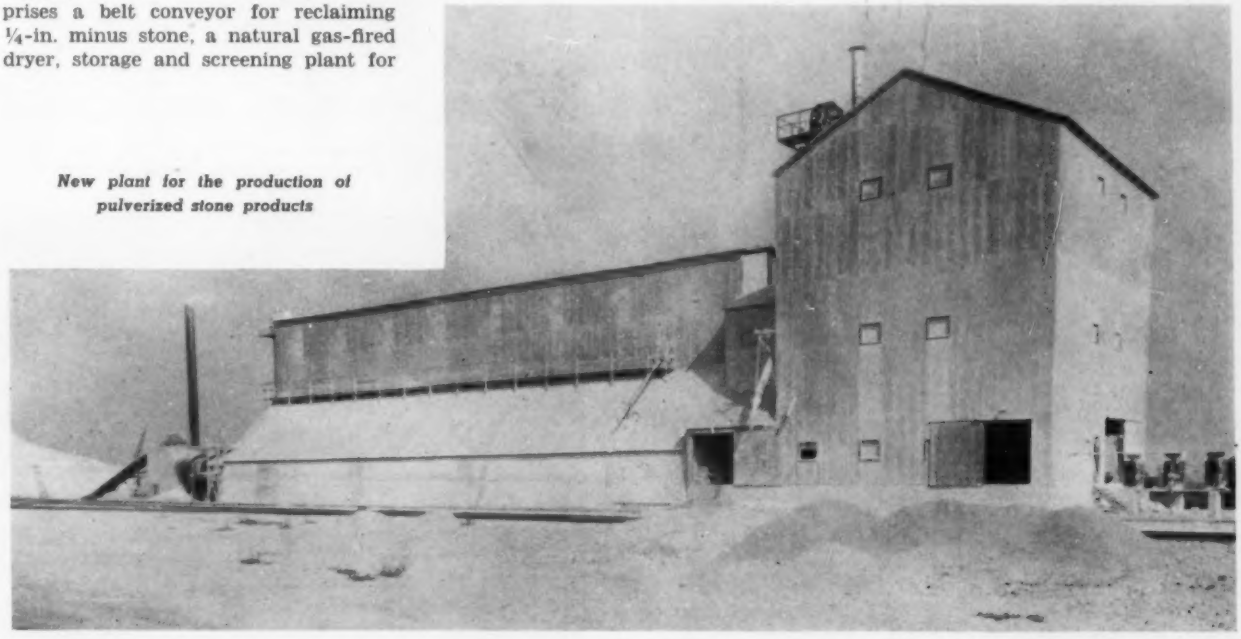
Dryer Fired By Natural Gas

The dryer has a pitch of about 24-in., and is fired by natural gas at present, although it is also equipped for burning coal. Under normal conditions, the capacity of the dryer is about 30 tons per hour, its output being the limiting factor in the plant capacity.

To turn over the screenings constantly during the drying process, the interior of the dryer is baffled. It is turned at 6 r.p.m. by a 20 hp. motor through a V-belt and a ring gear. Draft is natural, through doors at the discharge end of the dryer, and steam exhausts through a stack at the feed end.

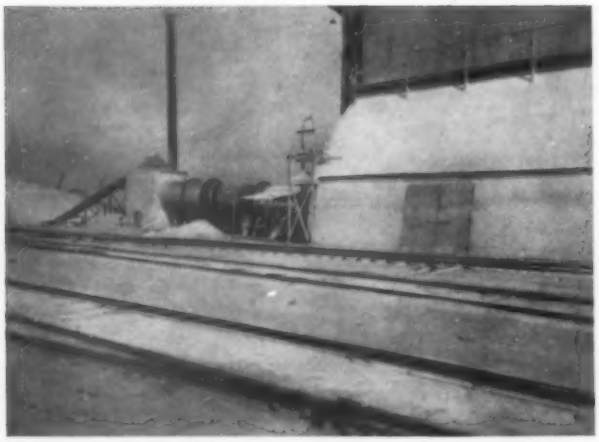
Moisture content in the dried product is less than one percent. The temperature in the dryer is kept constant at 1400 deg. to 1500 deg. F., regardless of the percentage of moisture in the feed, the dryer speed and the feeding belt conveyor speed being constant. The only adjustment is in the amount of screenings carried per foot of conveyor belt, which is varied at the hoppers by regulating the thickness of the bed on the belt.

It will be noted in the accompanying

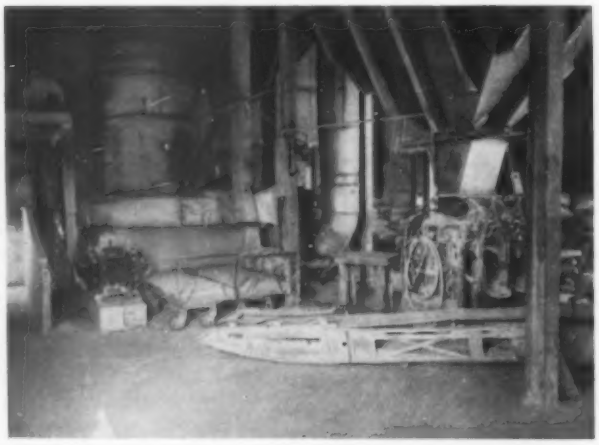


New plant for the production of pulverized stone products

Steps in Manufacturing Pulverized Stone



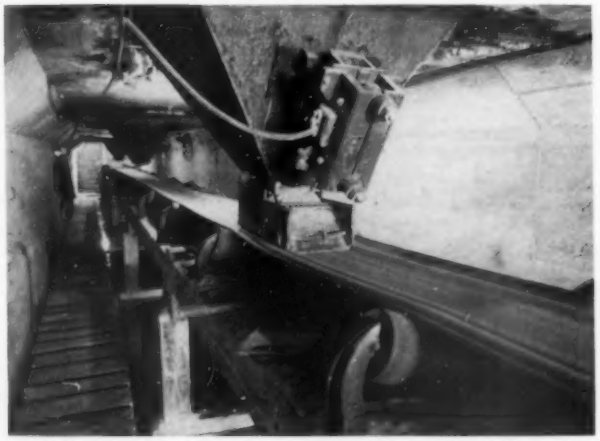
Screenings are passed through a rotary dryer to remove moisture. On the left may be seen the reclaiming conveyor and on the right is the new plant for pulverizing stone



Roll mill for the manufacture of various fine stone products

After stone has been run through dryer it is elevated and passed over this screen where a separation is made at 8 mesh

Right: Belt conveyor for delivery of minus 8 mesh stone from vibrating screen to another similar screen in the screen house



Vibrators on the hoppers insure uniform flow of wet stone to the reclaiming conveyor. Note knife edge adjustment on hopper bottom to regulate the amount of stone carried by the belt

Interior view of pulverizing plant showing one of the bagging machines, the pulverizer and draft fan for this unit

illustrations that this is done by raising or lowering the knife edge which determines the height of material coming from the hoppers. Through experience, the man in charge of the dryer can tell fairly closely what adjustment should be made. Drying of the stone adds about 15c per ton to the cost of manufacturing the various products made in this plant.

After the removal of moisture, the dried stone is lifted by a Webster chain bucket elevator, 50-ft. centers, to a 5- x 8-ft. Stephens-Adamson single-deck vibrating screen, where a separation is made over Ton-cap screen cloth and ¼-in. to 8-mesh stone is dropped into bin storage.

Minus 8-mesh stone is then put over a 3- x 8-ft. Universal single-deck vibrating screen by an 18-in. Stephens-Adamson belt conveyor, 54-ft. centers, and a separation is made on 16-mesh sq. openings. A further separation was formerly made over a third screen, but this practice has been discontinued, and the three products drop into bins.

Large Bin Capacity for Agricultural Stone

Demands for argricultural stone are variable with the crop seasons and have their peaks in the Spring and Fall; therefore large storage capacity is desirable so that farmers are properly serviced in these seasons.

Four bins, each of which has a capacity of 1350 tons, are located below the screen house. The bins are closed, with concrete walls reinforced to withstand the flow of material against the sides, and the screen house is of galvanized iron construction.

Below the four bins is an 18-in. belt conveyor, 145-ft. centers, for reclaiming sized material from any bin for shipment or for feed to the pulverizing mill. The conveyor is reversible to provide flexibility in reclaiming from the bins. In drawing stone, a 10-in. diameter screw conveyor, 10-ft. in length, mounted on wheels is used to feed stone to the belt conveyor. The conveyor discharge is to the boot of a Stephens-Adamson belt bucket elevator, 65-ft. centers, which raises the sized granular stone either to a 35-ton steel bin which feeds a pulverizer or puts it over a 3- x 8-ft. vibrating screen for loading by spout into cars on the railroad siding.

In direct car loading, any blend of stone sizes can be made from the bins on the reclaiming conveyor, as for example in making No. 1 meal.

Wide Variety of Pulverized Products

There is considerable flexibility in the manufacture of pulverized products. The mill, a 4-roll, air-swept Raymond pulverizer, receives its feed from the 35-ton bin through a rotary feeder.

Air is furnished to lift the fine product by a 24-in Clarage fan driven by a 50-hp. motor (direct-connected), and the finished product is forced through the whizzer plates to an 8-ft. cyclone where it settles into a 35-ton partitioned bin over a 2-spout Bates bagging machine. This is the procedure in making pulverized stone (75 to 80 percent minus 100 mesh).

On the Raymond mill the drive is through a V-belt and 75-hp. motor, and on the whizzer is by means of a 20-hp. motor through V-belt and a Reeves speed reducer.

In manufacturing other finer stone products, suitable adjustments are made in the mill and the 8-ft. Raymond mechanical air separator to produce the desired sizing. The products can either go directly to the bagging machine, to bin storage, or be chuted in bulk directly to cars. Bagged products are placed in cars or trucks over a 24-in. portable belt conveyor.

This company has a very progressive merchandising program in promoting the sale of its numerous stone products.

Quarry Operation

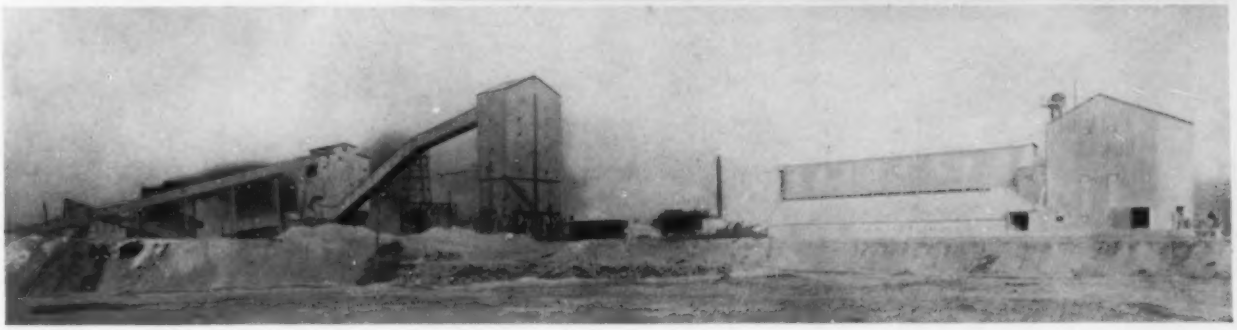
Haulage of stone in the quarry to the primary crusher is now being done with Ford-Thornton, 6-wheel trucks. A clean quarry floor is maintained, the rock being hauled to the crusher in three to four Ford-Thornton trucks equipped with the Thornton tandem 4-wheel drive. Steel bodies of the trucks are of special design with a load capacity of 6 tons. The loaded trucks, operated on pneumatic tires, weigh 10 tons. A 70-ft. face is being worked and loading is done by a Marion 3-cu. yd. shovel.

Officers of the company are Bert Herzog, president and general manager; J. Del Miller, vice-president and purchasing agent; and Fred Cramer, secretary. M. R. Gordon is superintendent.

Dumping stone into primary crusher

Loading stone into light trucks in quarry

General view of various plants taken from quarry. From left to right, lime plant, kiln and flux stone plant, commercial stone unit, and new building for fine stone products



Convert Rotary Lime Kilns

To Burn Pulverized Coal Fired at Feed End

By STAFF EDITOR

After many years of burning lime with producer gas in the rotary kiln at Milltown, Ind., the Louisville Cement Co. has substituted pulverized coal for fuel. The 8 x 125-ft. Vulcan kiln is now being fired with a Raymond 36-in. bowl mill of the type commonly used for firing cement kilns.

This departure from a practice of many years was made for the sake of economy and in the interest of quality control. By actual experience, pulverized coal automatically injected into the kiln with a constant fineness and temperature produces a more uniform flame and has correspondingly stabilized the quality of the lime. Constancy in burning and its positive control are, of course, of the utmost importance in producing a high grade chemical lime.

Firing from Feed End

Savings are due, in part, to differences in the types and prices of coal burned direct as compared to those for coal burned in producing gas. Variations in the coal burned, at this plant, have been shown to have a less apparent effect on the quality of the lime produced than similar variations would have in making producer gas.

The new coal mill has been installed at the feed end of the kiln, as was the case when burning producer gas, which is the reverse of general practice in firing cement and lime rotary kilns.

Much of the credit for a superior quality lime is attributed to the maximum heat transference taking place immediately after the stone enters the kiln. Before entering the kiln, the temperature of the stone is raised to about 1250 deg. F. by passing it through a 125-ft. Vulcan rotary preheater, counter-current to the induced draft. Upon entering the kiln, the preheated stone is immediately subjected to the maximum differential in temperature and, in its travel to the discharge end of the kiln, experiences a gradual falling off in temperature. Burning conditions in the kiln are observed and controlled by temperatures of the discharging lime. These temperatures average between 1900 deg. F. and 2000 deg. F.

The absolute lack of cores in the pebble lime discharging from the kiln is said to be due to the fact that an immediate maximum transference of heat in the hot zone penetrates to the very center of each stone particle and there is no formation of a hard, outer particle shell due to overburning of the outside of each stone particle, which seals the interior to subsequent burning. It is claimed that mixed sizes of stone may be burned together in the kiln and the lime will contain no core. Generally the top size fed into the kiln is 1½-in.

The coal mill is connected up in the conventional manner, receiving its primary air for drying the coal direct through a duct from the kiln hood. The primary air mixed with pulverized coal enters the kiln at 175 deg. F. to 200 deg. F.

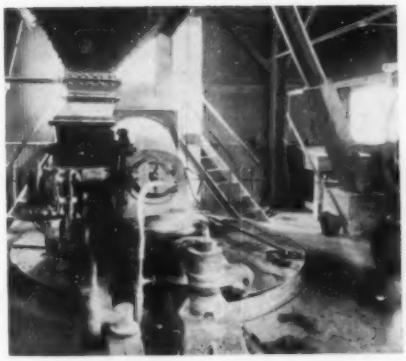
Use Gas Producer For Firing Shaft Kiln

Simultaneously with this installation, the gas producing equipment, formerly used to fire the rotary kiln, has now been installed to fire the vertical kilns. At present one of these 20- x 75-ft. kilns is in operation, but the gas producer has the capacity to fire both kilns. The producer, a No. 10 Wellman-Seaver-Morgan, is of the water seal type and is stoker fed.

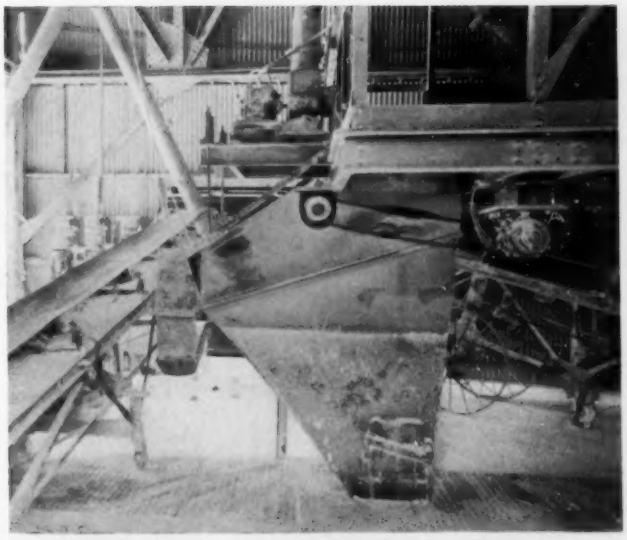
Steam is developed to 100 p.s.i. in a hand-fired boiler and a Coppus "turbo" fan forces the gas out of the producer into the kiln and the steam through the stone bed. Gas enters the kiln at 1200 deg. F. to 1300 deg. F. through six equally spaced ducts and burns at about 2000 deg. F. The natural draft has been augmented by erection of a 30-in. diameter stack, 35 ft. high, on top of the kiln. This has reduced the power consumption on the kiln by eliminating an induced draft fan.

Installation of this gas producer in place of less efficient equipment has improved the lime-fuel ratio and reduced the man-hours per ton of lime. Capacity of the kiln has been increased nearly 10 percent. The kiln is drawn

Left: View of continuous draw shaft kilns. Note recently added stack on right kiln to induce natural draft and reduce power demand on kiln. Right: Kilns with recently completed quicklime handling plant to the right



Coal feeder for gas producer. To the right is the steam turbine for inducing draft in the shaft kiln



Crushed quicklime is sized over double-deck screen and fines removed for shipment

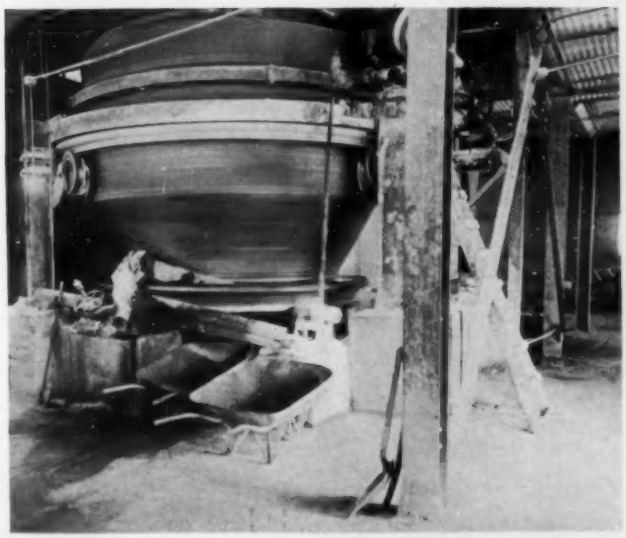
continuously at four points by feeders of the reciprocating type. The minimum size stone feed is the equivalent of a 4-in. cube. Coal burned at this plant has a B.t.u. value of 12,000 to 13,000 and is sized between 10 mesh and 1½-in.

New steel bins have been recently constructed for the storage of shaft kiln lime and portable conveying and handling equipment has been introduced in place of wheel-borrow handling.

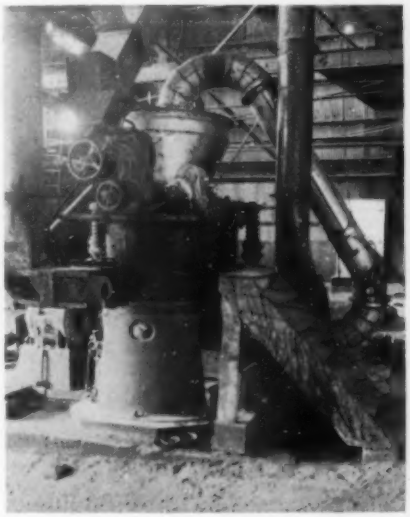
The draw-off arrangement is unchanged. All lime is passed over a picking belt and a stationary screen where a separation is made at 1-in. Minus 1-in. material is considered waste and is removed as such to be sold for agricultural purposes.

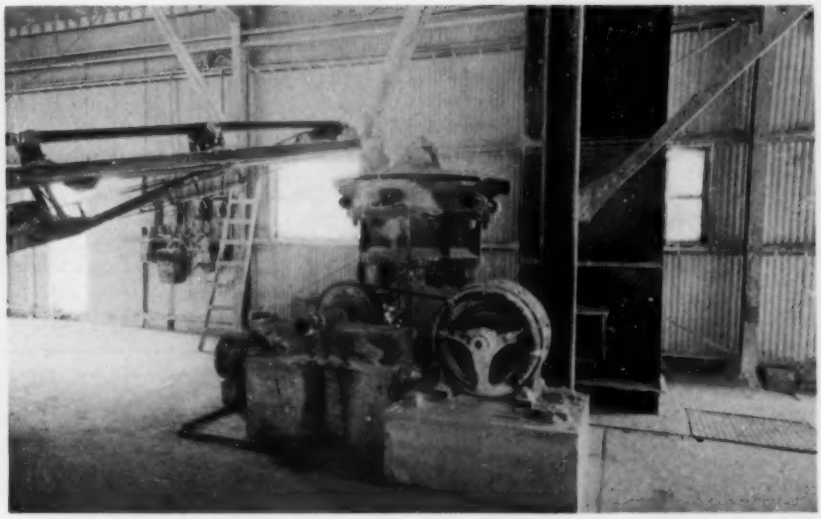
Plus 1-in. lime is carried over a 60-ft. centers portable conveyor (18-in. belt) to a Telsmith 5C gyratory crusher for reduction to 1½-in. minus. The crusher

(Continued on page 73)



Gas producer, formerly used to fire rotary kiln, now on vertical kiln





Left: Direct-firing coal mill which has replaced gas producer for firing rotary kiln. Right: Lime from the vertical shaft kiln is carried over a portable belt conveyor to a gyratory crusher to be reduced to minus 1½-in.

Estimation of

Phase Composition of Cement Clinker

Part 2

The present study is concerned with the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3. The ternary system CaO-Al_2O_3-SiO_2 will be considered only for the purpose of demonstrating the relation between graphic methods of estimating phase composition and the methods of computation which will be employed in dealing with the quaternary system.

The phase diagram of a ternary system is usually in the form of a triangular diagram. Certain mathematical properties of the triangular diagram are employed in tracing the course of crystallization and in estimating phase composition. These will be discussed briefly before considering the phase diagram of the system CaO-Al_2O_3-SiO_2.

Fig. 1 is a typical triangular diagram, representing the system A-B-C. Each point in the diagram represents a particular composition. The composition represented by M, for example, may be estimated by drawing straight lines through M, parallel to the three sides. These lines divide each side of the triangle into segments proportional to the percentages of A, B and C in M. To illustrate, the side AB is divided into three segments, AX_1, X_1X_2, and X_2B, which are proportional to the percentages of B, C and A respectively in M. If the side AB were divided into 100 percent intervals, the percentages of A, B and C in M could be read directly.

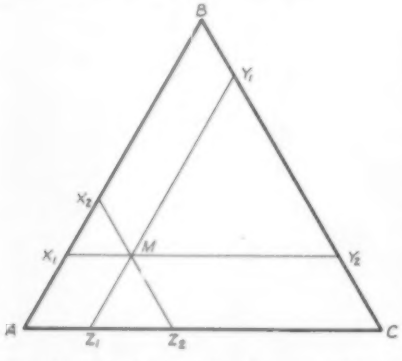


Fig. 1—Typical triangular diagram, illustrating method of estimating composition

Considering the segments on the side AB, it should be observed that the outer segments represent components at the ends of the side, but are reversed. That is, AX_1, nearest to A, represents the proportion of B, while X_2B, nearest to B, represents the proportion of A. The inner segment, X_1X_2, represents the proportion of the component at the vertex of the triangle opposite the side AB, that is, the proportion of C. The proportions of A, B and C are located in a similar manner on the remaining two sides.

Although Fig. 1 is in the equilateral form commonly used in phase diagrams, it should be understood that the same method of estimating composition may be employed with reference to any triangle. Since the proportions of A, B and C are indicated by segments on all three sides, it is evident that two are superfluous. It would be sufficient to draw lines from M to only one side, the only requirement being that they should be parallel to the two other sides. Fig. 2, for example, represents the system C_2S-C_2S-C_3A, in the form in which it appears within the equilateral triangular diagram representing the system CaO-Al_2O_3-SiO_2. This is in itself a triangular diagram, although not equilateral. In the figure, straight lines are drawn from N to the side C_2S-C_3A, parallel to the other two sides. The segments C_2S-E, EF, and F-C_3A represent the proportions of C_3A, C_3S and C_2S respectively in N.*

The method just described may be reversed. For example, let us suppose that a point representing 50 percent C_3S, 30 percent C_2S, 20 percent C_3A, is to be located in Fig. 2. Choosing the side C_3S-C_3A for the purpose, two points S and T are located, such that C_3S-S is 20 percent of the length C_3S-C_3A, and T-C_3A is 50 percent of the length C_3S-C_3A. The side is then divided to represent proportions of C_3A, C_2S and C_3S. Now if lines are drawn through S and T parallel to the other two sides, they will intersect at the required point.

Another method of estimating composition is illustrated in Fig. 3. Straight lines are drawn from each vertex through the point N. The proportion of C_2S is indicated on the line drawn from C_2S. The ratio of NA (the segment farthest from C_2S) to the entire line, C_2S-A, is the fractional proportion of C_2S in N. The ratio of the other segment, C_2S-N, to the entire line is consequently the sum of the fractional proportions of C_3A and C_2S. This method is convenient when only one component is under consideration.

An important property of the triangular diagram is illustrated in Fig. 4. In this figure the length C_2S-A is three times the length A-C_3S. The point A consequently represents a composition in which the ratio of C_3S to C_2S is 3.0, that is, 75 percent C_3S, 25 percent C_2S. A line has been drawn from A to C_3A. From a point B on this line, straight lines have been drawn to the side C_2S-C_3S, parallel to the other sides. By the principle of similar triangles, it can be proved that the ratio of the length C_2S-X to the length Y-C_3S is the same as the ratio of the length C_2S-A to A-C_3S, in this case 3.0, and that this is true when B is

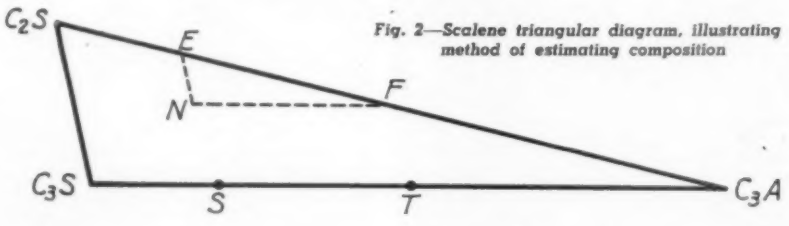


Fig. 2—Scalene triangular diagram, illustrating method of estimating composition

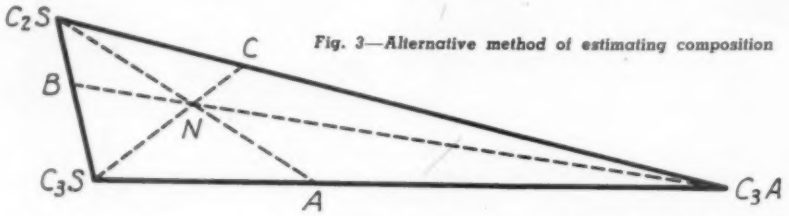


Fig. 3—Alternative method of estimating composition

In the System $3CaO.SiO_2$-$2CaO.SiO_2$-$3CaO.Al_2O_3$-$4CaO.Al_2O_3.Fe_2O_3$ at Clinkering Temperatures

By L. A. DAHL

Research Chemist, Portland Cement Association, Chicago, Ill.

located at any point on the line A-C_3A. It may be stated in general that when a line is drawn from a vertex to the opposite side, all compositions on that line contain the components at the end of that side in the same relative proportions.

A similar principle will be applied to the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3, and will therefore be considered at this time. A quaternary system is represented by a tetrahedron, which is a solid figure bounded by four triangular faces. The space model of the system A-B-C-D is shown in Fig. 5. Each of the faces is a triangular diagram. The point M_p on the base represents a mixture composed only of A, B and C. Lines are drawn from M_p to the side AC, parallel to the other two sides. The segments AX, XY and YC represent the relative proportions of C, B and A respectively in M_p. At any point M on the line DM_p the fractional proportion of D is equal to MM_p/DM_p. The relative proportions of A, B and C at any such point are the same as in M_p. In applying this principle to the estimation of phase composition in a quaternary system, the point M_p is referred to as the projection of M from D to the triangle A-B-C.

In the estimation of phase composition in the quaternary system, there will be occasion to employ projections of the type just described. It should be noted that the projection may be accomplished without the construction of a space model. For example, the point M represents a mixture of A, B, C and D. If the percentages of A, B and C in M are converted to a 100 percent basis for the three components, by multiplying each by 100/(A+B+C), the composition so obtained may be located at M_p in the triangle A-B-C as a projection of M.

A property of the triangular diagram and space model, which will be found to be particularly useful is illustrated in Fig. 6. The points V, W, X, Y and Z are joined by straight lines, forming a polygon. All compositions within the region V-W-X-Y-Z can be formed from the five substances at the vertices. Compositions outside of the region cannot be made from the five substances. The general principle may be stated as follows, and designated as principle 5.

5. All mixtures which may be formed from any given series of substances are located within the geometric figure formed by drawing straight lines between the points representing the substances.

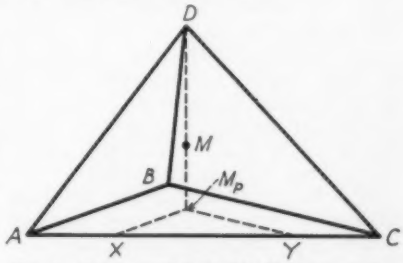


Fig. 5—Space model of the Quaternary System A-B-C-D

It was stated previously that the difficulties which arise in calculating phase composition are not in the calculations themselves, but originate in the data employed in the calculations, as obtained in phase equilibria investigations. When the phases which may be present, and their compositions, are known, the calculation of phase composition offers no great difficulty, since the method previously described is always applicable. The difficulty is usually in determining the phases which may be present. Much of this difficulty may be avoided by repeated application of principle 5. Let us suppose, for example, that a mixture at equilibrium is composed of C_3S, C_3A and a liquid, L. From principle 5, it is known without referring to any diagram, that the mixture must be in the triangle formed by joining the points C_3S, C_3A and L by straight lines. Similarly, a mixture composed of C_3S and a liquid E must be on the line C_3S-E. In any case in which the particular liquid phase and solid phases which may be present at equilibrium are not known, they may be found by applying principle 5 to all of the combinations which may appear from other considerations to be possible. When this is done, it will be found that all but one of these combinations will be eliminated, leaving only the phases which are actually present at equilibrium.

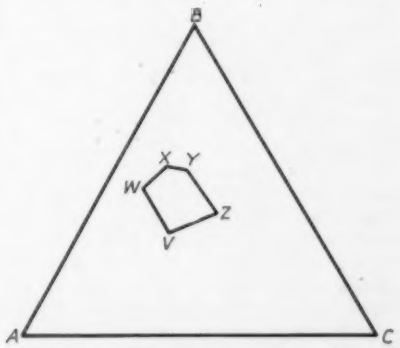


Fig. 6—Compositions which can be made from a given set of substances

The Ternary System CaO-Al_2O_3-SiO_2

Compositions involved in the estimation of phase composition of portland cement clinkers composed of lime, alumina and silica are located in the triangle CaO-C_2S-C_5A_3 in the system CaO-Al_2O_3-SiO_2, which was so thoroughly investigated by Rankin and Wright. (4) In Fig. 7, only the triangle CaO-C_2S-C_5A_3 is shown. The notation used in designating significant points in the figure is that used by Lea and Parker in their investigation of the quaternary system CaO-Al_2O_3-SiO_2-Fe_2O_3.

The dash lines in Fig. 7 are isotherms indicating the temperatures of complete fusion of compositions located on these lines. The temperatures of complete fusion of other compositions may be estimated by reference to the nearest isotherms. The isotherms are not smooth curves throughout, but change abruptly in direction at certain points. These points of change in direction are connected by curves which divide the diagram into areas known as primary

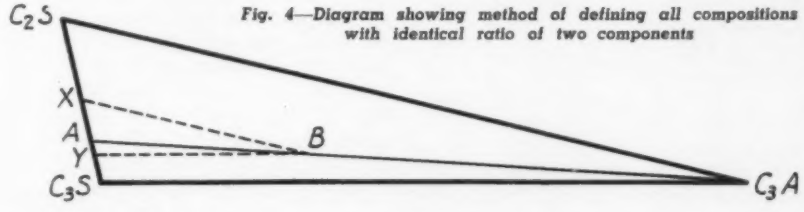


Fig. 4—Diagram showing method of defining all compositions with identical ratio of two components

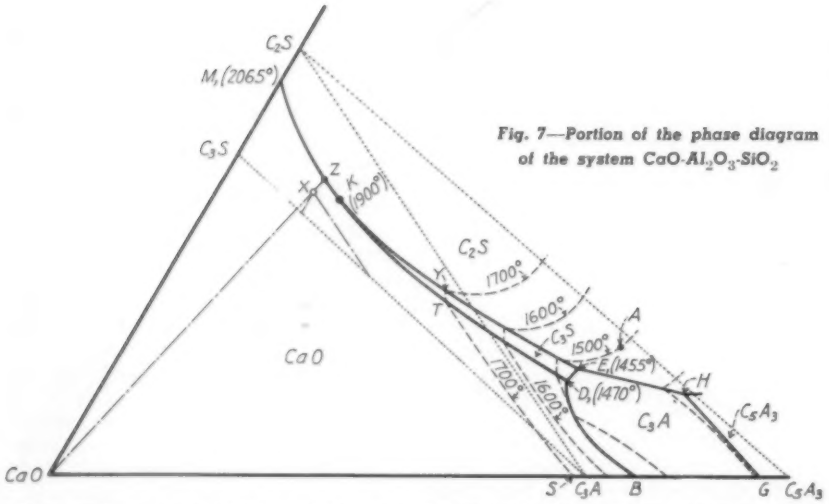


Fig. 7—Portion of the phase diagram of the system CaO-Al_2O_3-SiO_2

phase regions. In all liquids within one of these regions there is a particular solid phase which is first to appear as the liquid is cooled, and which is consequently known as the primary phase. For example, when any liquid within the area K-D-E is cooled slightly below its temperature of liquid formation, the solid phase which appears is C_3S. This is therefore the primary phase, and the region is known as the C_3S primary phase region. The primary phase for each region is designated in the figure.

If a liquid is held at its temperature of liquid formation, and its primary phase at the same temperature is added, no change occurs if the temperature is maintained. For example, if solid C_2S and the liquid at A, Fig. 7, are both at 1500 deg. C., the solid may be added to the liquid without the occurrence of any change in the quantity of any of the phases. This applies as well to the added C_2S, which will not be reduced in amount by solution in the liquid. The mixture is then said to be in a state of equilibrium, since the forces which would be involved in producing a change are balanced. The phase diagram consequently gives information concerning the temperatures at which the various liquids within it may exist in equilibrium with solid phases, and designates what those solid phases must be.

A liquid on the boundary between two primary phase regions may be considered as being in both regions, and therefore capable of existing in equilibrium with the primary phase in either region, or both. For example, a liquid on the curve KE, which is the boundary between the C_3S and C_2S primary phase regions, is capable of existing in equilibrium with solid C_3S or C_2S, or with both. This is usually expressed by the statement that it is capable of existing with C_3S and C_2S, but it should always be understood that it may exist at equilibrium with either one alone.

At the intersection of three boundaries the liquid may be considered as being in all three of the primary regions which meet at the point. It is consequently capable of existing in equilibrium with the solids designated in those regions. For example, a liquid of the composition E, Fig. 7, is capable of existing in equilibrium with solid C_3S, C_2S and C_3A, or with any one or any pair of these solid phases.

The point of intersection of three boundaries within a ternary diagram is termed an invariant point. The intersection of a boundary with one of the sides of a ternary diagram is an invariant point in the binary system represented by that side. As will appear later, large changes in phase composition may occur without change of temperature when a liquid is at an invariant point. Invariant points are therefore of special interest. The compositions of invariant points in Fig. 7, as determined by Rankin and Wright,(4) are given in Table 1.

Fig. 7, when interpreted by application of principle 5, supplies all of the information needed to determine what phases are present when any given mixture in the diagram is at equilibrium at any assigned temperature above the temperature of liquid formation. In the interpretation of the diagram, it is frequently necessary to refer to points representing the composition of the solid phases. These are consequently indicated in the figure. In addition, it will be necessary to refer to triangles in the diagram. A large proportion of these triangles have as one side the lines between C_3S and C_3A, and between C_2S and C_3A. These lines are therefore introduced in the figure as dotted lines. All portland cement compositions formed from CaO, Al_2O_3 and SiO_2 are in a region within the triangle C_3S-C_2S-C_3A formed by these dotted lines.

TABLE 1. INVARIANT POINTS IN SYSTEM CaO-C_2S-C_5A_3.*

Point	Temp. (Cent.)	Solid Phases	Per Cent CaO	Per Cent Al_2O_3	Per Cent SiO_2
B	1535°	CaO, C_3A	57.0	43.0	
D	1470°	CaO, C_3S, C_3A	59.7	32.8	7.5
E	1455°	C_2S, C_3S, C_3A	58.3	33.0	8.7
G	1395°	C_3A, C_5A_3	50.0	50.0	
H	1335°	C_2S, C_3A, C_5A_3	52.0	41.2	6.8
K	1900°	CaO, C_3S, C_2S	68.4	9.2	22.4
M	2065°	CaO, C_2S	67.5		32.5

*As stated previously, the diagram in Fig. 2 is taken out of the larger diagram for the system CaO-Al_2O_3-SiO_2. A mixture of C_3S, C_2S and C_3A in the proportions estimated from Fig. 2 would have the oxides present in the correct proportions to form N. It is not intended to be implied that the oxides must be combined in the form of C_3S, C_2S and C_3A.

Trade Practice Complaint

FEDERAL TRADE COMMISSION, Washington, D. C., has ordered five manufacturers of concrete pipe and other concrete products to stop certain practices which are alleged to be in the nature of a conspiracy to eliminate and suppress competition and to drive out competitors in the eastern seaboard territory where they operate. The order was directed against the Arlington Concrete Pipe Corp., South Washington, Va.; Lock Joint Pipe Co., East Orange, N. J.; F. B. and J. H. Gray, trading as the Gray Concrete Pipe Co., Thomasville, N. C.; Mid-Atlantic Concrete Pipe and Products Co., Norfolk, Va.; Concrete Pipe and Products Co., Richmond, Va., and Jack M. and J. Scott Parrish and H. W. Easterley, owners of all the capital stock of Concrete Pipe and Products Co

The Commission claims that the Arlington Concrete Pipe Corp. was organized in 1934 by the other respondents, who, through stock ownership, dominate and control it, and operate it to drive competition out of Virginia, Maryland and the District of Columbia.

CARROLL YOUNG, Hurstville, Iowa, has opened a concrete products plant on Route 61, where he is manufacturing various lawn and rock garden novelties. Mr. Young has a display at Hurst Park, adjoining the plant, showing how effectively his products may be used to beautify the landscape of homes and parks. He also expects to expand his business by the manufacture of new designs in ornamental molding.

Factors Influencing The Quality of Concrete

Testing Concrete and Aggregates Transferred From Laboratory to the Job

By J. C. SPRAGUE
Assistant Engineer, U. S. Engineers Office

Testing of concrete has taken on new significance in recent years, and the rate of development is accelerating in a very hopeful manner. One of the encouraging signs is the growing tendency to transfer testing from the research laboratory to the job; thus the man who makes the product is in closer touch with the tests and ready to take instant advantage of their results. As testing methods and apparatus are simplified, the tendency to test on the job seems likely to grow.

Concrete quality is a relative term. It is not necessary, for instance, to build a structure in a warm, dry climate to resist frost action. Nor is it essential that as great a strength be developed in a gravity concrete dam as in concrete building members, although resistance to abrasion, and volume change in the former may be of greater importance. In short, the aim should be to obtain concrete of a quality consistent with economic considerations, and the type of structure which is to be built.

The quality of concrete is dependent on many factors, any one of which may be reflected in the finished product. The accompanying chart, "Quality of Concrete," tells the story graphically and almost at a glance. For instance, the engineer may not be obtaining the desired strength, density or other quality which he should. By referring to his chart, and through a process of elimination, he may trace the trouble to one or more of several causes—perhaps to the control, or measurement, of the constituent materials; or to the mix design; or to curing.

The quality of concrete should depend on economic considerations and the type of structure contemplated. Too often, however, the quality is adversely affected by other factors such as dirty or unsound aggregate, lack of uniformity, porosity, volume change or some other factor. Due to lack of proper supervision, the mix may not be the proper one for the structure to be built —there may be too much, or too little cement, or the water content may not be the optimum one.

An attempt has been made in the chart to show the various factors which control the quality of concrete. Each of these factors will be discussed briefly.

Factors Affecting the Strength of Concrete

The strength of concrete, as of other building materials, consists of compressive, tensile, flexural, shearing and torsional qualities, and is affected directly by the relative amounts of cement and mixing water; the higher the relative water content, the lower the strength.

Most concrete structures are designed on the principle that the effective concrete area shall be stressed in compression only. Consequently the compressive strength of concrete is one of its most important qualities. For years this factor served as a "yard stick" to measure the quality of concrete, but now it is becoming more and more apparent that there are other considerations which are just as important—in some cases, more important. For instance, flexural strength and wear resistance are taking on a new significance in constructing highways. In certain types of structures the durability and volume change of concrete may be of paramount importance. Fortunately, all of these factors are controlled largely by the water-cement ratio of concrete and are, therefore, more or less related to each other.

Due to the fact that the quality of concrete is the final measure of the usefulness of an aggregate, a cement, or an admixture, the compression test plays an important role in the selection of these materials.

The tensile strength of concrete does not play a very important role at present, and is determined only infrequently. No standardized method has been established for making this test—each investigator employs methods especially devised for the particular investigation being made. Because of the difficulty in making this test, and for other reasons, it has generally been considered advisable to measure this stress of concrete through the use of a more convenient method, namely, the determination of flexural strength, or resistance to cross-bending.

Flexure tests of concrete beams are used widely in connection with thin slab construction and they seem to be particularly useful for determining the time at which it is safe to open a pavement to traffic. A majority of the state highway departments are now employing flexure along with compression as a measure of concrete strength.

Tests for strength of concrete in shear and in torsion have been made in comparatively few laboratories. The creation of pure shear, unaccompanied by other types of stress, is difficult and this fact probably accounts for the rather wide divergence in results obtained.

Tests for shear have been made either by the use of a beam in which the load was applied adjacent to the point of support, thus inducing single shear, or double shear was induced by the use of two loads applied just inside of the points of reaction. The so-called punching tests have also been used to some extent.

Torsion tests of concrete are even more scarce than shear tests. Although torsional stress appears in certain applications of the elastic theory of design, it has no particular significance except when used for determining the modulus of elasticity of concrete in shear, for in structures it is practically impossible to develop torsional stresses unaccompanied by other and more significant kinds of stress.

Durability Investigations

The importance of durability in concrete has long been realized but, like other qualities of concrete, it had not been investigated to any great extent until recent years.

The freezing and thawing test is, without doubt, the most significant yet devised for measuring durability in concrete. This test has not yet been standardized, although the American Society for Testing Materials has issued a "Proposed Method of Testing Concrete and Concrete Aggregates by Freezing and Thawing"[1]. The disruptive action of sodium sulphate and magnesium sulphate has been used to a limited extent to simulate freezing and thawing action, but no correlation seems to exist between the two tests. The water tightness of concrete (par-

ticularly its ability to resist absorption) seems to show promise as an indication of its general durability. If water does not readily enter the pore spaces of a concrete mass, the concrete will in general be less affected by freezing and thawing action. Results of tests indicate that the percent volume of water absorbed, after a number of cycles of freezing and thawing, increases considerably sometimes; and this further indicates that there is less pore space for relief of the expansion caused by ice formation for each consecutive freezing.

Securing Uniformity In Concrete

Uniformity of the quality of concrete throughout its mass is one of the most important factors in its manufacture. Uniformity of the properties and qualities of the constituent materials is an important factor. Each unit of a material, therefore, should possess, as nearly as possible, the desired properties and qualities to the same degree. Segregation of the constituents in the concrete mix is one of the main reasons for nonuniformity, and segregation is difficult to control; as a matter of fact, no satisfactory method for measuring the degree of segregation of materials in concrete has yet been standardized. One method suggested for measuring segregation in concrete employs the measure of bleeding action of the mixing water from plastic concrete mixtures[2, 3].

In the final analysis the workability of concrete determines whether or not it will be of uniform quality in the structure. In order to be workable, concrete must be mobile and free from segregation. The development of vibrating tools for placing concrete is an important step in producing uniform concrete in that it is possible to lower the water content and thus one of the causes of segregation.

Workability of concrete is a major subject in itself, and is one of the most important factors in deciding the type of mix to use in a given structure. The fact that it has been relegated to a comparatively minor place in this discussion should not detract from its importance. Without a workable mix, it would not be possible to place concrete.

Density Controlled by Water-Cement Ratio

Density of concrete is controlled directly by the water-cement ratio. The definition given this factor by the American Society for Testing Materials is that it is the ratio of solids in the concrete to the total volume of the mass. In general, the importance of density in concrete is not given as serious consideration in this as in other countries. Fuller made some very extensive tests on density, and as a result evolved his maximum density theory for designing concrete mixtures. It is believed that concrete density will assume a place of greater importance in the future, as it is definitely related to water tightness and durability of concrete.

Resistance to Wear

Abrasion of concrete is another test which has not yet been developed to any great extent. Abrasion can probably be classified as grinding action and impact, and is in general affected by surface strength of the structure, durability, homogeneity, density, and quality of constituent materials.

Comparatively little research has been carried out on the wear resistance of concrete. Abrams developed a test whereby he subjected specially prepared specimens to abrasion action in the Talbot-Jones rattler. Scholer has made tests with 9-in. spheres tested in the standard A. S. T. M. brick rattler. The Bureau of Public Roads has developed several tests to simulate wear on concrete pavements. Mattimore developed an impact wear test.

Volume Change

The primary object of volume-change studies is prevention of cracking in concrete structures. It is doubtful if, at the present time, any reputable engineer will undertake to produce a structure which is absolutely free from cracks. On the other hand, by studying the factors that produce volume changes in concrete, and by studying the effect of conditions relating to the concrete itself upon these changes in volume,

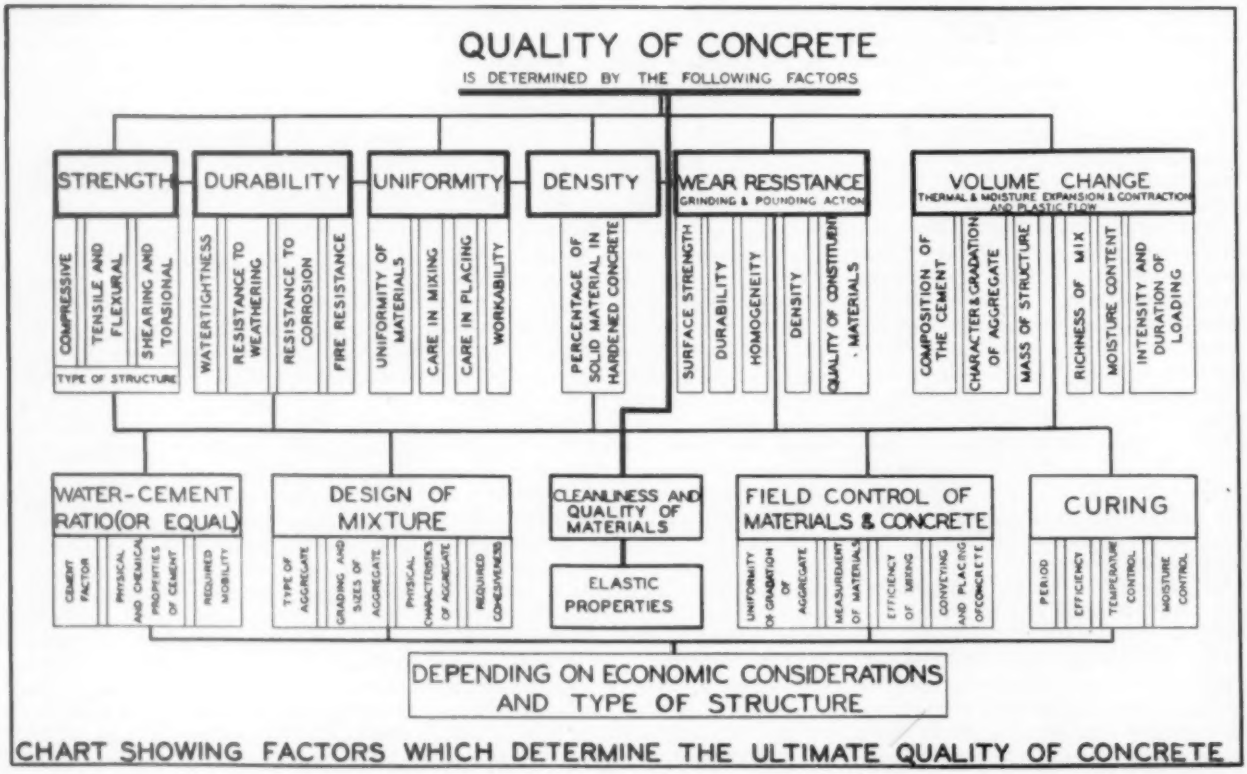


CHART SHOWING FACTORS WHICH DETERMINE THE ULTIMATE QUALITY OF CONCRETE

investigators are accumulating data that are a great aid in controlling the amount of cracking to at least a reasonable and harmless degree. Aside from changes in volume due to stress, thermal expansion, moisture expansion and contraction, and flow under sustained loads are the physical evidences of volume changes. The composition of the cement, characteristics of aggregate, mass of structure, richness of mix, and water-cement ratio all have more or less effect on volume change of concrete.

In the past few years, volume change testing has been accelerated due to the construction of several massive structures, such as Boulder Dam. The Bureau of Reclamation has done invaluable work in this field and stress, strain and joint meters have been developed for measuring actual changes in a large structure, over an extended period of time.

In the laboratory several methods have been developed for measuring volume changes but the possibility of comparison of results between different laboratories is precluded due to the lack of uniform procedure of testing. A uniform procedure for volume-change tests of concrete is now under consideration in Committee C-9 of the American Society for Testing Materials. The proposed method would involve the use of 6- x 12-in. cylinders, with reference plugs cast in the ends of the specimen, and with observations of length made by means of a dial extensometer.

The factors brought out in the foregoing are all more or less inter-related and are each controlled by the water-cement ratio, design of mixture, field control, and curing.

Mix Design

There have been a great number of methods proposed for designing concrete mixtures and they range all the way from the rule of thumb method of a 1-2-4, or 1-3-6 mix to highly complicated calculation methods. The former is without rhyme or reason and certainly there is no logic in setting up complicated formulas which could not possibly work under all conditions, or even under any considerable number of conditions. The Portland Cement Association is encouraging the use of the Trial Mix Method which is a very practical method. However, the experienced concrete technician will develop his own methods, following certain very definite rules, and will obtain satisfactory results.

Control of Materials and Concrete

No matter how thoroughly the preliminary work has been carried out, it would be lost if proper control were not exercised in placing the finished material. By placing is meant the entire operation of properly measuring the designed qualities, mixing them thoroughly, transporting the concrete to the forms with the minimum amount of delay and distributing it in the forms so that segregation does not take place. If the grading of the aggregate is not kept uniform, time has been wasted in making an economical design.

The method of measurement of the ingredients has been greatly improved during the past few years. In the old days when sand and gravel was shoveled into a "buggy", cement dumped from a sack in which several pounds were invariably left, and water introduced through a hose with no attempt at control except to see that there was plenty introduced in the mixture, it would have been foolish to make elaborate preliminary tests with the view of controlling the ultimate quality of the material. It is not intimated that all concrete placed before present control methods were introduced was bad—much of it was of excellent quality. But the concrete which has lasted was placed under rigid control, knowingly or unknowingly.

Several years back, before the "era" of wet mixtures, concrete was placed almost powder dry, and then tamped in place. Many concrete structures placed in this manner are as good today as they were when built. On the other hand, many structures placed in the past 20 years, where sloppy mixtures were used, have disintegrated badly.

Proper Curing Methods

Curing of concrete is the final step in its manufacture. We could go through all the stages up to this point very carefully but, if proper curing were not used, the concrete would not be much good. A great deal of research has been devoted to curing. The Engineering Experiment Station, University of Illinois, carried out some very valuable tests on curing several years ago. The Portland Cement Association, Bureau of Public Roads and other organizations have contributed heavily to the subject.

In a series of tests conducted by the Army Engineers in the Huntington District, the results of which were published by the American Concrete Institute[4], it was developed that for every degree F. variation in curing temperature, there was a concomitant variation of about 30 p.s.i. in compressive strength. Thus if the curing temperature were lowered 10 degrees, there would be an accompanying loss of about 300 p.s.i. in the strength of the concrete.

This discussion has necessarily been limited to a general consideration of the factors controlling the quality of concrete. Little has been said about specific tests—there being so many that they could not all be given proper consideration in so short a discussion. In general, it may be said that testing comes under three classes, i.e., acceptance tests, informational tests, and investigational tests. Each has its place, but the value to be obtained from any one of them is dependent upon a knowledge of the significance of the test. To be able to judge the meaning of the test and to interpret the significance of the results, is essential to a proper evaluation of the work.

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[1] Proc., A.S.T.M., Vol. 32, Pt. 1, pp. 364-366 (1932).

[2] "Evaluating Fines in Concrete on a Bleeding Test Basis," Proc., American Concrete Institute, Vol. 33, p. 29.

[3] Discussion of Paper "Factors of Workability of Portland Cement Concrete," Proc., American Concrete Institute, Vol. 32, p. 763.

[4] "Effect of Curing Temperature on the Compressive Strength of Concrete at Early Ages," Proc., American Concrete Institute, Vol. 32 (1936).

Fuel Efficiency In Cement Manufacture

A VALUABLE CONTRIBUTION to the literature on fuel efficiency, particularly as it relates to cement manufacture, is the 92-page Report No. E-5, prepared under the direction of the Bureau of Mines, U. S. Department of the Interior, as a National Research Project of the WPA. The collaborators of this report are well-known to the industry and are authorities on the subject: Geoffrey Saeger, now chief chemist of the Gulf Portland Cement Co., Houston, Texas, Nicholas Yaworski, and Vivian Spencer representing the National Research Project of the WPA, and O. E. Kiessling, an economist of the Bureau of Mines.

The report is divided into three major divisions: The Trend of Fuel Economy, Technical Progress in Energy Consumption at Cement Plants, and Prospects for Further Fuel Saving in Cement Production.

Under the division, The Trend of Fuel Economy, the report covers economy in the use of minerals, fuel savings of hydraulic cement plants, and cement manufacturing studies to determine the process of fuel economy. Technical Progress in Energy Consumption at Cement Plants deals with technology of fuel consumption in rotary cement kilns and the improvements of equipment which have led to economies. In the division, Prospects for Further Fuel Saving in Cement Production, the possibilities of future economies are pointed out. It is suggested that the Lepol kiln, first used in Europe, and now being introduced in this country, would offer excellent possibilities of reducing coal consumption.

Wood As A Lime Kiln Fuel

Third Article of Series

Reasons for Poor Efficiency in Some Plants

By VICTOR J. AZBE, *Consulting Engineer, St. Louis, Mo.*

As pointed out in the second article of the series in the September issue of ROCK PRODUCTS, the actual performance of typical wood-burning kilns does not approach the theoretical efficiency.

But why, if the upper limit is a ratio anywhere from 4 to 10 tons of lime per cord, are the actual results from 2 to 2¾? Why is the practical operating efficiency only from as low as 10 up to 45 percent? Why did Moosehorn have an efficiency of 74 percent or twice as high, and again why does not even this plant approach closer to 100 percent. Putting it in other words, why does not the wood-fired kiln of today produce twice the lime per cord than it does? All this is not hard to answer and as we appreciate the situation today, corrections are not so difficult either. The reasons for the inefficiency in short are as follows:

If the average CO is 4 percent, the loss of fuel is 15 percent. If the cooler loss is 28 percent, then with this 15 percent we already have accounted for a total of 43 percent of the losses. If our ratio is 2.4, correction of above deficiencies would give us a ratio of 4.4 tons of lime per cord. This is quite a difference, but we have still other possible gains.

To eliminate CO, wood instead of being burned in hot fireboxes, must be gasified at a lower temperature and the gas sent into the kiln to be burned with the hot air coming up through the cooler. Merely attempting to reduce the air going to the fireboxes and sending the air up through the cooler will help to make gas producers of such boxes, but to do the job right, more should be done, as will be shown later.

If wood had an ash similar to coal, there might be some reason to burn down and clean the fireboxes. However, as wood has hardly any ash and this ash always is loose and easily hooked through the grate, burning down is ordinarily done just to permit the fireman to trim the kiln. When the fireman stands in front of the large firing opening in order to see through, sometimes for long as an hour, a large volume of cold air passes up the kiln causing a very serious loss in efficiency. Chart I—(B) shows the high oxygen and low CO_2 content of this period. The air enters cold and leaves the hot zone at 1600 deg. F., the stack loss being the same when fuel is or is not burned on the grates. Losses due to excess air may readily average up to 10 percent or even more, but if it is assumed that 10 percent of the ratio is reduced, this loss due to excess air is entirely unnecessary. Kilns should have small, properly located poke holes for trimming. In the summer this work could then be done much better than by the clumsy and cruelly hot method through the large firing door. When done this way, the fire would not be burned down completely, but merely checked and the firing delayed to reduce the mass of radiant gas, thus permitting observations when trimming.

It was stated that a kiln has a fixed capacity for handling gases if not aided by mechanical draft, but it is not necessary to increase the gas flow to obtain higher capacity. If we return heat from the cooler, more lime will be made; if we burn the CO again, more lime will be made, but the flow up the kiln will still be the same. The radiation loss from the kiln is about 10 percent, but if we make twice as much lime it will be only 5 percent.

Based on these results, the following final conclusion can be formed, assuming that the wood is oak and the lime is high calcium, as for example, the Springfield installation shown in Table III in the September issue of ROCK PRODUCTS.

If the ratio is 2.4 to 1 and by using the cooler 25 percent is saved, our ratio becomes 3.2 to 1. If we assume complete combustion, we certainly save 13 percent and our ratio is raised to 3.9 to 1. If we eliminate kiln cooling during the draw and excess air in the low fire periods, we save 8 percent and the ratio reaches 4.4 to 1. With all radiation loss reduced another saving of probably 4 percent is made, giving us a ratio 4.8 to 1. The final result is that twice as much lime is produced per cord, at half the cost of fuel, with a greater possible kiln capacity and lower labor cost. Practical operating efficiency will be 88 percent

LIME FORUM

Mr. Azbe is a contributing and consulting Editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

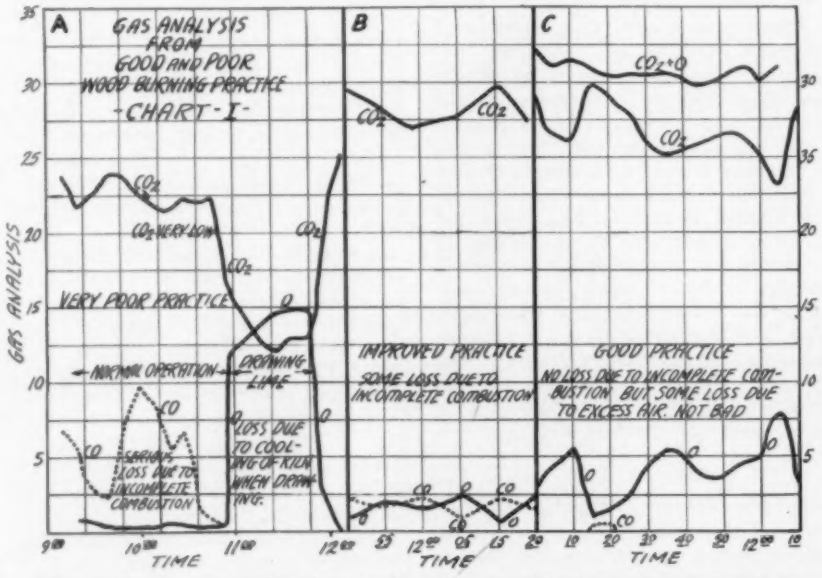


Chart I—Showing gas analysis from good and poor wood burning practice in lime kilns

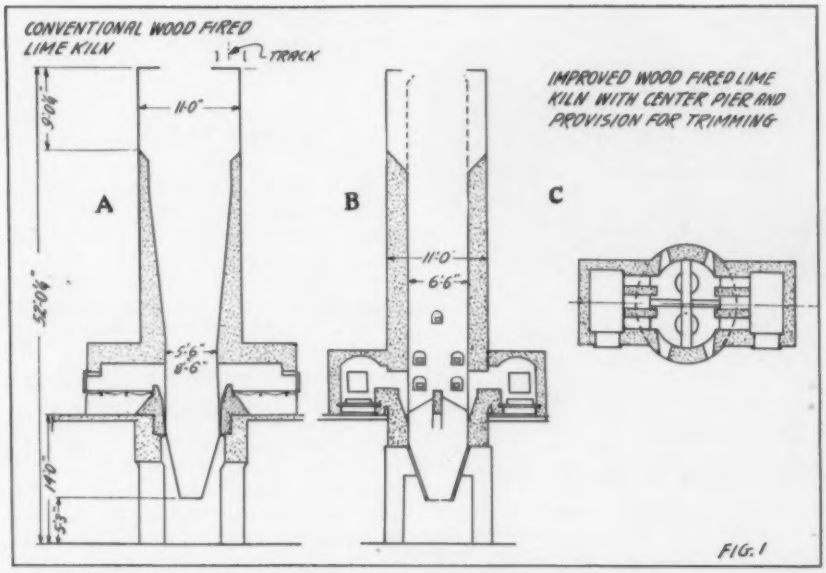


Fig. 1—(A) Conventional wood fired lime kiln, the efficiency of which cannot be improved. (B) and (C) Improved types in which the fire boxes are long with a center pier and poke holes for convenient trimming

instead of 44 percent. Some heat will still be wasted but perfection is impractical. That this is not a mere dream is shown by results at Moosehorn where not all the requirements were satisfied, but where the practical operating efficiency is 74 percent.

Fig. 1-(A) shows the ordinary clumsy, inefficient lime kiln which does not permit improvement, no matter how skillful the firing results may be. With such kilns the cooler cannot be utilized, complete combustion cannot be satisfactorily obtained, and regularity is impossible of attainment.

Fig. 1-(B) and (C) are improvements. The fireboxes are long, both are fired from the same side, and there is a center pier and poke holes for trimming so located that the lime from over the eyes can be worked into the cooler before the middle is dropped. Fireboxes are fired alternately and worked as semi-gas producers, most of the air coming up the cooler. The scheme has faults but results will be immensely better.

The next and best step would be a kiln equipped with a gas producer connected by a center burner to the kiln as shown in Fig. 2. In this case, gasification of wood would be at a constant rate because temperature in the producer would be low and fuel bed very thick. The gas would be introduced in the kiln at the most desirable point, the center. With such an arrangement, combustion would be complete, lime would be cool and its sensible heat recovered, and the loss resulting from excess air would also be low due to steady gas supply. The practical operating efficiency should exceed by at least 10 percent the 74 percent obtained at Moosehorn.

Wood gasifies so readily that it should only be used in this manner. Only in this way can its combustion be controlled at all satisfactorily, and gas from wood is not as poor as one may think. Wood refuse, consisting of about 50 percent each of chip and sawdust and containing about 35 percent moisture, has been used as a gas producer fuel. Gas from cypress refuse has a calorific value of 130 to 135 B.t.u. per cu. ft. and from pine refuse, 161 B.t.u. per cu. ft.

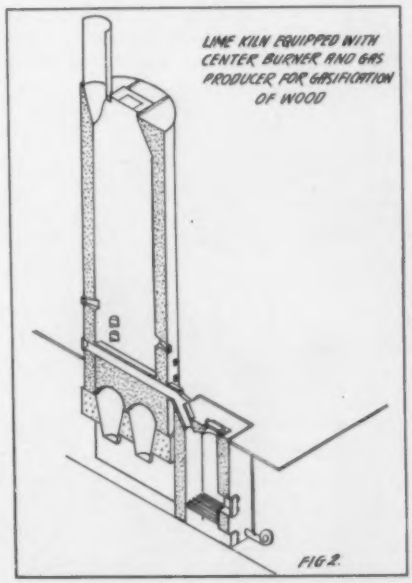


Fig. 2—An advanced design of wood fired lime kiln equipped with a gas producer connected by a center burner. Gasification proceeds at a constant rate

Of course, this is not exactly the true heat value of gas because before the determination is made the gas is cooled and the water vapor condenses out. Gas from wood carries a great deal of water vapor.

A gas from coal, however, is also high in moisture, not only because coal may have 10 percent moisture but there will be water from the unavailable hydrogen. In addition, to prevent the coal from clinkering, steam is introduced and most frequently half a pound is used per pound of coal. Gas from coal is therefore almost as wet as gas from wood, with the difference that steam costs money in both fuel as well as labor of boiler firing, boiler upkeep, etc. Wood fired producers of the kind illustrated do not need steam nor much air because wood consists mostly of volatiles.

CORRECTION—In the second article of this series, published in the September issue, there is an omission and two errors of sufficient importance to justify correction.

In Table II the heading for column six should read "Heat value per cord of 90 cu. ft. millions B.t.u."

In Table III the Lee, Mass., and Stonewall, Manitoba, plants are burning dolomite and not high calcium stone, as stated.

SONNER BURNER CO., Winfield, Kans., has opened its new rockwool plant which, it is estimated, will have an annual payroll of $50,000.A high quality white wool is made from stone obtained at a local quarry. It is said that the rock from which the wool is made is free from alkali and iron, which causes rock wool to be dark in color. The Sonner Burner Co. has been a manufacturer of gas burners for the past 12 years.

THE UNION LIME CO., Republic, Wash., has resumed production of its modern plant which was completed about two years ago. W. W. Gifford is director of operations. Mr. Gifford, Richard Phillips, and S. S. Frantz are the incorporators. Mr. Frantz is in charge of finances, and Mr. Phillips directs sales activities. Austin Ward is superintendent and chemist, and H. M. Church is plant foreman.

Various products are manufactured: agricultural hydrated lime, mason's hydrated lime, industrial chemical hydrated lime, finishing hydrated lime for plastering, pulverized quick lime, limestone flour, lump lime and agricultural ground limestone.

HINTS AND HELPS for Superintendents

Soil-Heating Cable Used for Testing Concrete Samples

THE MASTER BUILDERS CO., Cleveland, Ohio, uses electric soil-heating cable in a controlled atmosphere chamber to assure accurate compressive-strength tests on samples of concrete admixtures.

Testing concrete samples in controlled atmosphere chamber

Tests must be made in a room kept at approximately 70 deg. F. and 100 percent relative humidity. Small samples are cured in this atmosphere and tested at predetermined intervals over the period of a year.

Formerly, a water bath was used to keep the samples at a constant temperature. It proved cumbersome and generally unsuited to the job. At the suggestion of an electric-heating expert the manufacturer replaced the water system with five lengths of General Electric electric heating cable placed about the base of the test room. Heater controls were installed outside the laboratory. A thermostatic bulb was placed inside the room to regulate the temperature automatically. Water sprays in the top of the testing room were used to keep humidity at the desired 100 percent.

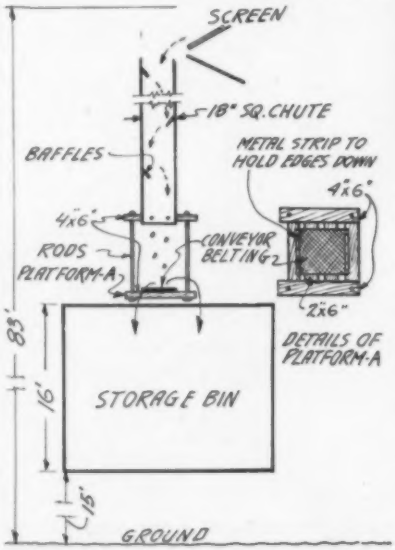
E. W. Scripture, Jr., chief chemist of the company, says: "This arrangement gives us positive control of temperatures with the maximum of efficiency and the minimum of equipment. Electric heat thus is enabling our laboratory to make the accurate tests which help us manufacture high grade concrete admixtures."

Preventing Stone Breakage

A LARGE LIMESTONE CRUSHING PLANT in the South was designed so that the screen oversize, 2½-in. stone, was dropped by vertical chute a considerable distance into bins. There was quite a large amount of breakage due to the height of fall and complaints were often made that there was a large percentage of small stone in a supposedly large size stone shipment.

The top of the sizing screen, over each of two similar 20- x 20- x 16-ft. bins, was 83 ft. above the ground, the bottom of the bins was 15 ft. from the ground, and the bins were 16 ft. in height. Since about 7 ft. of altitude was lost in passing over the screens, the actual drop of stone ranged from 45 to 61 ft., depending on the height of stone in the bins.

This difficulty was solved quite simply by the use of several pieces of 2- x 6-in. and 4- x 6-in. lumber and a section of old 18-in. conveyor belt. The chute from each screen to its bin was 18 in. on a side. Two 4- x 6-in. pieces of timber were bolted parallel to each other on opposite sides of each stone chute near its bottom. The pieces of timber were slightly over two feet in length, extending a few inches beyond each side of the chute.



Showing method of preventing stone breakage where screen is located high above bin storage

From the 4- x 6-in. timber supports four vertical rods, fastened at the top, were suspended and to the bottom ends of the rods a "platform" was bolted to break the fall of the stone at the bin tops just before it enters the bins. The lower "platform" consisted of two similar 4- x 6-in. pieces of lumber with 2- x 6-in. pieces running crosswise to make up the floor. To this platform a two-foot length of old 18-in. conveyor belting was fastened with bolts to withstand the shock of the falling stone from the chutes. The velocity of the stone was further reduced by placing baffles in the chute at 4-ft. intervals.

Producing Powdered Dolomite for Putty

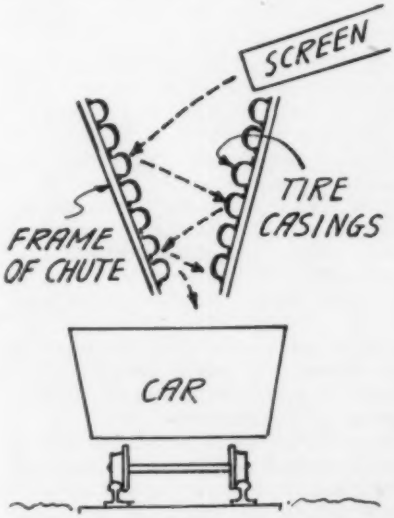
ONE OF THE PRINCIPAL PRODUCTS made by the Universal Marble Products Co., Thornwood, N. Y., is powdered dolomite, used extensively as a base for putty. This company has been very successful in operating its plant with a minimum of electric motor maintenance in spite of the fact that these units operate in an atmosphere laden with dolomite dust. The motors have been in service over 15 years, including one unit which is 36 years old. The oldest unit is a G.E. 53-hp. 900 r.p.m. synchronous motor hooked up to a 220-volt, three-phase, 60-cycle generator. This performance record is remarkable when it is considered that these motors are not of the totally enclosed, fan-cooled variety now available.

Two 20-hp. squirrel-cage induction motors driving secondary gyratory crushers through a chain drive

Other motor equipment includes two G.E. squirrel-cage type, 220 volts, 60 cycles; one of 40-hp., 1200 r.p.m., belted to a suction fan, and the other a 50-hp., 900 r.p.m. belted to a Raymond mill; a G.E. wound-rotor induction motor, 40-hp., 720 r.p.m., 220 volts, 3-phase, 60 cycles, belted to a gyratory crusher; a squirrel cage induction motor belted to a Sturtevant ring roll crusher; and two G.E. squirrel-cage induction motors, 20 hp., 1200 r.p.m., each driving secondary gyratory crushers through Morse chain.

Eliminating Wear in Gravel Chutes

COLUMBUS GRAVEL CO., Columbus, Miss., operates a gravity screen plant for direct loading through hopper chutes into cars. The chutes are approximately 15 ft. in length so that cars can be



Old tire casings provide wearing surface of gravel chute

loaded with only two stops. To save wear in the chutes due to impact from gravel falling directly into them, the chutes are lined completely with pieces of old tire casings, about 12 in. in length. These are nailed directly to the timber with ordinary nails. The tires cost nothing, but their use has saved the chutes from wear and replacement.

An Unusual Use of A Crusher

LAKE VIEW CONCRETE TILE CO., Lake View, Iowa, in producing sand and gravel for the manufacture of concrete products, has developed an efficient plant with several original features.

Gravel to be crushed is chuted to a small 6- x 8-in. Universal jaw crusher on the roof of the concrete products plant, the crushed material thereby

Small jaw crusher for crushing oversize gravel which is returned to be rehandled by slackline bucket

being re-handled without the use of an additional bucket elevator.

The crusher discharge is chuted into the path of the scraper excavating bucket, where it is "picked up" by the bucket as it emerges from the excavation and returns to the screening plant with the fresh feed.

Safety Block for Quarry Cars

THE MOORES LIME CO., Springfield, Ohio, rigged up an interesting remote control safety block to prevent quarry cars from slipping down an incline leading to the lime kilns. The simple but effective device was designed by John Moores, president of the company.

As shown in the illustrations, the safety block is operated by the man at the hoist on the top of the incline. The operator pulls the cars up and, before leaving the hoist to uncouple the cable, he throws the block across the rail back of the car wheel.

The safety block comprises a steel plunger mechanically operated by the operator from a lever at the hoist through a long rod connecting with the plunger rod.

Left: Safety block in clear position. Right: In position across rail

Steam Engine Drive On Asphalt Mixer

IN THE ILLUSTRATION is shown an interesting application of steam engine drive geared to an asphalt mixer in which the exhaust is used for heating purposes. This is a modern steam engine made by the Troy Engine & Machine Co., Troy, Penn.

While the unit shown in the illustration is used to drive an asphalt mixer, there are undoubtedly many

Steam engine with exhaust used for heating

similar applications of equipment of this kind to be found in the rock products industry. This is particularly true of locations where equipment is not housed and the materials must be kept warm during the winter months.

Appraising Safety Work

Second Article of Series Discusses Inspection Methods

By A. J. R. CURTIS

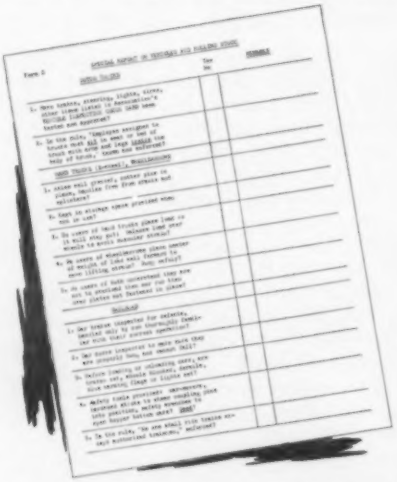
Secretary, Committee on Accident Prevention & Insurance Portland Cement Association

The first article on this subject which appeared in August discussed several of the cardinal points in evaluating mill safety work, including studies of (1) Plant accident reports, (2) Company and plant policy, rules and practices relating to accident prevention, and (3) Company and plant safety organization. In the present article another very important factor will be discussed; namely, inspection of the physical properties, including mechanical equipment, tools, material and other items that make up the worker's environment.

Accident causes may be divided broadly into those which fall under the head of (1) human behavior and (2) environment. However, the study of *environment*, or for practical purposes *plant inspection*, is of far greater importance in the prevention of accidents than merely discovering and rectifying physical hazards about the plant. It provides one of the best means for acquiring the habit of systematic safe thinking and of otherwise training one's self or one's associates in personal safe conduct. The most important requirement for attaining long accident-free plant records is the acquisition of safe working habits by supervisors and workers—so that they will conduct themselves safely as a matter of course. The right kind of plant inspection provides excellent training for the men who should be cultivating personal safety habits.

What should a good plant safety inspection cover? Everything on the plant premises. The outlines given later on in this article illustrate to some extent the detail into which it is necessary to go to complete a thorough and dependable inspection. Let no one assume the job is so simple that it can be performed dependably except by men of experience and ability to penetrate. Even when done by such men it is impossible to be sure that the job has been reliably completed except with the aid of a "check list", made up in advance and including all items, large and small, which should be inspected.

Without a check list for the use of inspectors it is utterly impossible for anyone to remember all of the items that must be carefully covered, or to report comprehensively at the conclusion of the inspection. Using a "check list" as a report form, the inspector's report might be worded about as follows:



Special report (Form C) on vehicles and rolling stock is helpful in reducing accidents and preventing break-downs of equipment

"We have carefully inspected all items called for on the list and in addition thereto all others which came to mind, and which we have noted hereon. With the exception of items specifically reported (in writing) to be in an unsafe or otherwise unsatisfactory condition, we believe the plant physical equipment to be reasonably safe."

In this connection, it may be well to observe that no inspection of the plant should be considered as a satisfactory safety inspection unless a written report is filed with the superintendent or safety committee. Such reports should be retained permanently for purposes of comparison and for other uses. In the average run of plants, inspections on which comprehensive reports have been filed are decidedly in the minority. If it is not your present practice to so report your inspections, your practice is deficient in a very important regard.

From the foregoing it is obvious that we may enter the following as the first two rules to be observed in making safety inspections:

1. *Use a currently revised check list as basis for inspections and inspection reports.*

2. *A written report must be filed of every safety inspection.*

What Should Inspection Period Be?

The question as to how often a plant should be inspected for accident hazards is one that has been discussed a great deal without always producing positive conclusions. But where one general inspection at intervals is to cover the entire plant, it is common practice to inspect thoroughly at periods ranging from two weeks to a month.

A fairly popular method and one which would seem to deserve more general application, supplements monthly plant-wide inspections with individual monthly department inspections and special inspections of chain, chain hooks, cable and other equipment requiring frequent attention by men especially trained and charged with the responsibility of looking after them. In that case the general inspection is made by the mill inspection committee and department inspections by foreman or sub-foremen in each department. It would seem safe to put down the following as our third rule:

3. *Complete plant inspections will be made at least once every month while the plant is in operation, and immediately before the resumption of operations after every shut-down.*

Another question which comes up frequently in almost every establishment where earnest efforts are made to secure efficient safety inspection is that of how to choose and train safety inspectors. This subject has even more interesting angles in plants where it is desired also to use these inspections as a means of safety training for the force. Many establishments make what I believe to be the mistake of saddling all such inspections on the plant safety director; I know of a few cases where the same individual has done all of the safety inspecting for years. This arrangement may seem to work satisfactorily but it is not the best way to handle the matter.

Purposes of Inspection

Let us proceed with the assumption that a mill should be inspected for both purposes mentioned above:

(*a*) To discover physical hazards and eliminate them, and—

(b) To train as many men as possible to be safety-minded, by teaching them to discover hazards and develop some aptitude in eliminating the latter. There should be more than one pair of eyes in a mill expert in spotting potential danger points.

If we subscribe to this dual purpose for conducting physical inspections, we must eliminate at the outset the method by which the inspecting is done entirely by the mill safety director. Of course, the case must be considered of the mill organization which does not have a safety director. Let us decide first to place the responsibility of the entire matter of proper inspection with one of the following:

1. Plant safety director, if there is one.

2. Assistant superintendent, if no safety director.

3. Superintendent, if no assistant superintendent.

In plants that employ a safety director, one excellent recommendation made by several cement organizations is that general inspections be conducted by a committee of two men, of which the safety director is a permanent member and the other member, who does not serve for consecutive inspections, is selected from the group of department heads and their assistants.

A Good Arrangement

The preferred arrangement for the second member of the inspection committee is for the use of inside and outside department men on an alternate schedule, perhaps somewhat as follows: General mill foreman, quarry foreman, chief engineer, general yard and labor foreman, master mechanic, electrical repair foreman, kiln foreman, chief chemist, assistant quarry foreman, and mill shift foreman.

A slight variation of this arrangement, in plants which have no safety director, is to assign the assistant superintendent, general mill foreman to the permanent place on the inspection committee. Another idea is to rotate both members of the committee aiming always to have an inside man serve with an outside man. In such case each committee member may serve for three consecutive inspections and changes made so that an experienced member is always a holdover.

If general inspections are held every two weeks it is possible to greatly increase their value as training for the plant force. In such case a committee for one inspection might consist of an experienced inside man and a relatively inexperienced outside man; the next inspection committee might consist of an inexperienced inside and an experienced outside man. The arrangement might continue indefinitely with a great deal of benefit to the inexperienced men chosen.

All arrangements such as the choosing of men for such important service and the setting of the period between general inspections will necessarily vary considerably with the individual qualifications of available men, size of plant and organization and other local peculiarities best dealt with by an alert superintendent. So the foregoing must be considered merely as suggestions gathered from experience and not as plans that are always best, regardless of local conditions.

The idea of holding department inspections is a good one, and should meet with the approval of all department heads. There is a good reaction among the men if department inspections are set a week ahead of known or expected dates of general plant inspection. That gives the "boys" in each department who are keen, an opportunity to "scoop" the general inspectors, and this is something they all like to do from the department head down. Then, if the general inspectors are able to turn the tables on them, department groups have to admit they were beat at their own game, on home grounds, fair and square.

No one could propose a check list for guidance in making plant inspections that would exactly fit any individual case. That would be quite impossible. The check list submitted here is intended only as a foundation upon which individual cement plant check lists may be built. More changes will be necessary, obviously, if this list is to be adapted to other plant use.

Inspection Check List

Quarry

1. Drills, Well:—Is drill rope in good condition? Are clutches properly adjusted? Are other parts of drill in good condition? Is drill properly grounded? Is safety belt provided for use when working on top of derrick?

2. Quarry Face:—Is quarry face clean and free from loose rock? Are lifelines and safety belts provided for workers on quarry face?

3. Quarry Floor:—Is quarry floor level and free from unnecessary loose stone? Are approved blasting shelters provided? Are compressed air hoses and pipes adequately protected against damage?

4. Explosives:—a. Storage: Is storage magazine at safe distance from working face, from other buildings and from highway? (See NSC Safe Practices Pamphlet No. 28.) Is storage magazine dry, waterproof and moderately cool? Are blasting caps and explosives stored in separate magazines?

b. Transportation: Are trucks carrying explosives properly equipped with fire extinguishers? Is electric wiring on such trucks completely insulated? Are brakes, lights and all safety features properly adjusted? Are explosives and blasting caps always transported in separate vehicles?

c. Handling: Are fuses cut to uniform length? Are fuse ends square and properly crimped in blasting caps? Are non-metallic tools provided to open explosives boxes?

5. Electrical Equipment:—Are cables suspended on trestles across quarry floor? Is cable covering free from breaks or cracks? Are electricians' rubber gloves and other protective equipment in good condition?

6. Shovels:—Are shovels free from mechanical defects? Are electric shovels properly grounded? Are guy wires, hoisting cables, etc., in good condition? Is adequate safety valve provided on air compressor?

Plant

1. Crushing Department:—Is stone car hoisting cable in good condition? Is hoisting mechanism in good mechanical condition? Is crusher opening adequately guarded? Are safety belts provided? Are lifelines attached to belts short enough? Are stone hooks unbent and in good condition? Is discharge end of primary crusher adequately guarded? Is housekeeping satisfactory?

2. Stone Conveyor:—Are handrails provided on each side of walkways paralleling stone belt? Are adequate warning signs provided against adjusting or cleaning moving belt? Are buckets of bucket conveyor securely fastened to chains? Is housekeeping satisfactory?

3. Stone Storage:—Are safety belts and lifelines in good condition?

4. Raw and Finish Mills:—Are conveyors in good mechanical condition? Are all exposed gears adequately guarded? Are screw conveyors properly guarded? Are drive belts in good condition and under adequate tension? Is adequate storage space provided for surplus balls and slugs? Is lighting adequate? Are separators and other dust containers and conveyors leakproof? Is housekeeping satisfactory?

5. Coal Grinding Department:—Are direct or semi-indirect type driers separated from pulverizers by fireproof and dustproof partitions? Are driers constructed according to approved standards? Are relief vents to the outside air provided at approved points? Also apply rigidly the same standards as in raw and finish mills, especially in reference to leakproof condition of conveyors, separators and dust collectors. Are "No Smoking" signs conspicuously placed and rigidly enforced? Is housekeeping satisfactory?

6. Burning Department:—Are coal blowers and pipes leakproof? Are torches built according to approved standards? Is clinker discharged into cooler without unnecessary scattering of hot particles? Is kiln gun in good working order? Are exposed gears and trunnions adequately guarded. Are flue dust chambers leakproof to prevent escape of hot dust? Is adequate safety equipment available for dust chamber cleaners? Is housekeeping satisfactory?

7. Stock House:—Are all conveyors in good condition and adequately enclosed? Are safety belts and lifelines provided for use when it is necessary to enter silos?

8. Bag Storage:—Is bag cleaner enclosed and equipped with adequate dust collectors? Are "No Smoking" signs in place and rigidly enforced? Are bags stacked in an approved manner and properly cross tied? Is housekeeping satisfactory?

9. Pack House:—Is driving mechanism of packing machines enclosed? Are packing machine spouts in good condition? Are hand trucks provided with both hand and foot guards? Is gang-plank from platform to railroad car strong and provided with proper anchorage?

10. Electrical Department:—Are all switches in all departments approved type? Is all wiring in 1st-class condition? Are switch locks furnished to all repairmen? Are all exposed parts of switches, rheostats, motors, turbines, etc., properly guarded? Are rubber gloves, mats and other protective equipment in good condition? Are motors, turbines and switchboard frames properly grounded? Are all fuses protected by a switch? Are insulated fuse pullers provided in a convenient place? Are knife switches mounted so that blades are dead when open? Is back of control board guarded and gates locked, so that unauthorized persons cannot have access to it? Is insulation on

all extension cords unbroken? Are outer shells of sockets of extension cords made of porcelain or other non-metallic insulating material? Is housekeeping satisfactory?

11. Shops, Stores and Repair:—Are all exposed belts, gears and drive shafts properly guarded? Are saws, punch presses, etc., equipped with adequate guards? Are grinders adequately hooded and exhausted? Are safe storage places provided for hand tools? Are all hand tools properly dressed? Are adequate locks, signs and other safeguards provided for use of repairmen working on "location"? Are aisles well marked and kept clean? Is separate space, enclosed and well ventilated, provided for arc welders? Are welders' masks lightproof? Are ladders, scaffolds and other equipment of repairmen, built according to approved standards? Are they in good condition? Is housekeeping satisfactory?

12. Yard and Railroad:—Are separate entrances and exits provided for trucks, railroad cars and pedestrians? Is view at truck entrance and exit unobstructed? Are all grade crossings properly guarded? Are rail beds adequately ballasted? Are rails properly spiked to ties? Are switch stands sufficiently far from tracks to insure clearance for trainmen? Are all frogs, switches and guard rails suitably blocked to prevent a person catching his foot in them? Are stub ends of spur tracks equipped with standard bumping blocks? Are derailers provided on sidings? Are wooden trestles sound? Any evidence of destruction by termites? Are obstruction guards and "No Clearance" signs provided at points where cars come too close to buildings to permit adequate clearance? Are wheel flanges, brakes and other operating parts of cars and engines in good condition? Are safety valves, pressure gages, etc., on locomotives in good condition? Are suitable locking devices provided on dump and trip cars to prevent premature dumping? Are exposed gears, sprockets, shafting, etc., on locomotive cranes properly guarded? Is there at least fourteen-inch clearance between crane body and truck bed? Is folding gate or fence provided to keep men out of danger zone while crane is operating? Are all trucks in safe operating condition? Are all chains, cables, ropes, and slings in good condition? Are clips properly applied (U-bolt over short end of cable)? Is a dry, well ventilated storage place provided for ropes? Are hand tools in good condition? Are wheelbarrows and hand trucks equipped with hand guards? Are wash and locker rooms clean and in good condition? Are separate compartments for street and work clothes provided? Is housekeeping satisfactory?

Department Inspection

Herewith are presented specimen departmental report forms which can be easily adapted to specific department use. Experience will dictate changes and improvements in the interests of completeness and convenience. Departmental safety inspections are well worth while because the men of any department are closer to possible or probable hazards than anyone else and it should be a matter of personal pride with them to discover and report or remedy hazards before general plant inspectors get around.

Form A may be developed into a departmental safety report. Form B is intended primarily as a report on "housekeeping." It is important, too, for good housekeeping in any plant or department is an indispensable aid to safety. Here is some actual evidence, all of it from recent cement plant experience.

Poor Housekeeping Contributed to These Accidents

1. Laborer stepped on empty broken powder box which had been left lying at a steep angle in muck pile on side of drift—fell heavily on his back.

2. Repairman stepped on rusty nail in board.

3. Clean-up man was moving bags. Bags in bundles fell from pile above onto his back while he was stooping. He received permanent injuries. Section of bags that slid off main pile was 8 layers high and 4 tiers wide. Bundles had not been reversed every other layer to allow for greater thickness at valve end and pile was higher toward center than outside. A few days previously men had walked over top of pile in taking bag inventory, causing bags to become further displaced.

4. Three men were lowering conveyor box to floor—one man's leg was caught and badly bruised between the box and piece of shafting lying on floor. Plant safety director said in his report: "This case could easily have been prevented if the men had taken just a moment's time to clear away the old equipment and debris which prevented the job from being done in safe workmanlike manner."

5. Workman stepped on nail protruding from piece of lumber—the only piece of board anywhere near—which had been taken off a small door.

6. Employe was repairing cab of locomotive. Using an old gasoline drum as a scaffold, he measured angle iron, got down and placed it on drum to burn it off. Drum heated, causing explosion. A broken leg resulted.

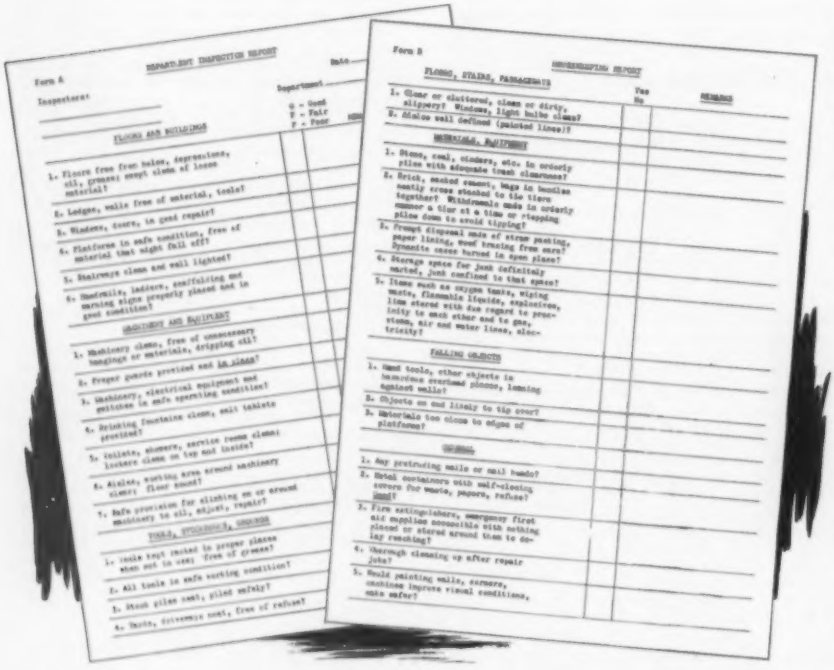
7. Employe was turning off motor starters by the light of a flashlight when he stepped into a pool of oil and slipped, falling on his back.

8. New kiln section was being raised into place, cross ties being used as cribbing. Injured stepped on small wooden wedge, lost balance and fell about 3 ft. In falling he grasped at a wooden block but was unable to check himself. Block fell after him, striking left side, breaking rib.

9. Employe was using hand truck to help unload sacked cement from auto truck. In moving backward with loaded hand truck he tripped when one wheel hit small rut in floor. Load shifted and he fell, twisting left foot, breaking bone.

Special Inspections

Every plant includes in its equipment several or many items requiring special inspection by persons especially qualified. Chain is an outstanding item of this kind. Chain hooks is another. Cable falls in this class. Hand tools are generally so classified. Plant automotive equipment, boilers and electrical devices are on such a list. Respirators, goggles and other safety apparel must be looked over specially. Likewise, items of first-aid equipment which may deteriorate. Fire extinguishers also fall in this category. Irrespective of arrangements for general and departmental inspections, alert superintendents will insist on examinations, at frequent periods, of special items, by trained men.



Two important check reports. Form A is the department inspection report and Form B is the housekeeping report

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THE TEXAS STAFF AND STONE CO., Houston, Texas, owned by D. Baccaro and son, J. Baccaro, have moved into larger quarters, having purchased an industrial site on the north side of Clinton Road. To take care of increasing demands for its products, the company built a new building, 85- x 100-ft. This company, which has been established for nine years, makes cast stone for buildings and ornamental purposes.

NATIONAL ASSOCIATION ACTIVITIES

Sand and Gravel

ALL EYES have been turned to Washington, D. C., to learn what decisions may be made at the meetings of the executive committee, National Sand and Gravel Association and the boards of directors of the National Industrial Sand Association and the National Ready Mixed Concrete Association on September 26, 27, 28, 29 and October 4.

In announcing the meeting of the National Sand and Gravel Association, Executive Secretary Ahearn pointed out that all active members were invited to attend. The immediate purpose of the meeting is to give consideration to the Federal wage and hour law and the work of the National Economic Committee as they affect the sand and gravel industry. Following action taken at the meeting, it is proposed to make available to all members, in advance of the effective date of the statute (October 24, 1938), complete information as to its scope. Considerable uncertainty exists as to the provision in the statute concerning its application to industries engaged in interstate commerce or in the manufacture of goods to be shipped in interstate commerce. There has never been an official and inclusive definition of the words "interstate commerce", even by the Supreme Court. Secretary Ahearn points out that the courts have always refused to give such a definition, saying that individual cases will be determined upon their merits as they arise. The Federal wage and hour law does not specifically confer upon the Administrator the right to say what industries are subject to the law and what industries are not. If he should pursue the policy that all employers must make their own decision as to whether they are covered by the statute, extreme confusion will necessarily result.

So far the Administrator has done no more than to say that only interstate commerce industries are affected; but in drawing distinctions, he seems to suggest that only local service industries are intrastate. No specific reference has ever been made to the sand and gravel industry which, in many cases, produces and ships exclusively in intrastate commerce. The question arises as to whether it will be held that companies of this character are subject to the law if, at any given point, they compete with other producers who do ship across state lines.

As many members of the industry use navigable waters for transportation of their products, a definition by the Administrator of the word "seamen" in the statute would help to clarify the law.

Aggregates Conventions Going to Cincinnati

THE NATIONAL SAND AND GRAVEL ASSOCIATION and the National Ready Mixed Concrete Association have announced that the joint annual conventions and exposition of these groups will be held at the Netherland Plaza Hotel, Cincinnati, Ohio, on January 25, 26, and 27, 1939.

During the week immediately following the annual conventions of the sand and gravel and ready mixed concrete associations, the National Crushed Stone Association will hold its convention at the same hotel. The dates of the three conventions represent an improvement over the arrangements a year ago, both for the convenience of operators who will attend all conventions and of manufacturers having exhibits.

Lime

PRESENT PLANS for the A.S.T.M. regional meeting in Columbus, Ohio, next March contemplate the presentation of a Symposium on lime. Prof. James R. Withrow, chairman of Committee C-7 on Lime, has accepted the responsibility for developing a program for the symposium, and work on this is now under way. Papers will be devoted to properties and tests of lime with perhaps some reference to the related manufacturing problems. The National Lime Association is requesting that suggestions for this Symposium be sent directly to the association offices or to Prof. Withrow, Ohio State University, Columbus, Ohio.

It has been announced that the Marblehead Lime Co., Springfield, Ill., plant has qualified for membership in the Thousand Day Club of the lime industry, its safety record having been certified by the Bureau of Mines.

Ready-Mixed Concrete

STANTON WALKER, director of engineering for the National Ready Mixed Concrete Association, called a meeting of all technical committees of the association which were held on September 26 at the Willard Hotel, Washington, D. C., preceding the board of directors' meeting on September 27. These committees were as follows: Technical Problems, Standards, Truck Mixers and Agitators of Revolving Drum Type, and Truck Mixers and Agitators of Revolving Paddle Type.

Industrial Minerals Division A.I.M.E.

THE FALL MEETING of the Industrial Minerals Division, American Institute of Mining Engineers will be held as a joint meeting with The Society of Economic Geologists at the Hotel Farragut, Knoxville, Tenn., October 6 to 8. J. R. Thoenen and Stanton Walker will act as chairmen of the Industrial Minerals Division at the meeting on October 7. Addresses at this meeting include: "Methods Used in Prospecting for Mineral Aggregates", by Edgar R. Kendall; "Durability Studies of Aggregates", by W. E. Cate; "Production Methods at Hiawassee Dam Aggregate Plant", by F. Cadena; and "The Use of Bleaching Clays in Water Purification", by Paul Wier. There will also be papers of general interest to rock products producers at the joint sessions. At the Los Angeles meeting of the A.I.M.E., on October 21, there will be a joint meeting of the Industrial Minerals and Petroleum divisions. Papers of particular interest to the rock products industry include: "Production and Utilization of Talc in the Southwest," by B. M. Burchfiel; "Mineral Insulating Materials," by B. M. Snyder and Frank R. Wicks; and "Mining and Preparation of Sand and Gravel in Southern California," by Harry D. Jumper.

National Safety Congress Meeting in Chicago

THE NATIONAL SAFETY COUNCIL is celebrating its 25th year of safety work this fall in a Silver Jubilee to be held at the Stevens Hotel, Chicago, Ill., on October 10 to 14. To date 300 speakers' invitations have been issued and 255 have accepted. The Cement & Quarry section program is now complete in nearly every detail.

NEW MACHINERY AND EQUIPMENT

Vibrating Grizzly Feeder

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis., has developed a combination of their Utah vibrating feeder and the cantilever grizzly which is

Combined feeder and scalping unit

known as the Utah electro-magnetic vibrating grizzly feeder.

Their regular cantilever grizzly operates on the principle of particles of ore falling on bars which are supported only at the head end. The impact of the heavy pieces of material causes the free end of the bars to vibrate and thus increase screening efficiency. The Utah electro-magnetic feeder is a high frequency alternating current, vibrating feeder, and is a highly efficient feeding mechanism, it is claimed, for both fine and coarse material.

The combination of the Utah vibrations and the cantilever grizzly principle is designed to make an efficient combined feeder and scalping unit for use ahead of crushers to scalp out the fines from the crusher feed; for use in loading conveyor belts by cushioning the fall of coarse material on the fines which would drop through ahead of it, and for many miscellaneous purposes around the material handling plants. This unit is made in all sizes from 18 in. to 72 in. and for any reasonable capacities.

Improved Blasting Agent

E. I. DU PONT DE NEMOURS & CO., Wilmington, Del., has developed a new grade of "Nitramon" blasting agent which is called "Nitramon" No. 2. It is said to have all the safety advantages of the regular "Nitramon" and is to be used in the same way as the regular grade.

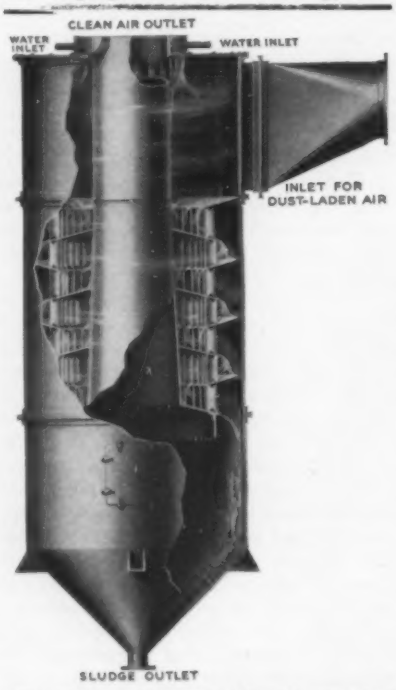
The new blasting agent is slower than the regular grade, but it is sufficiently sensitive for quarry blasting, and is claimed to be adapted to soft limestone and as a top load in harder material. Its density is great enough so that it will sink in water holes and has a strength equivalent to 40 percent ammonia dynamite. Velocity is 10,000 ft. per second.

It will not produce headache from handling and the metal containers simplify loading where large quantities are used. Water resistance is indefinite provided the cans remain intact. The blasting agent is non-freezing.

Dust Collector

STURTEVANT MILL CO., Boston, Mass., has designed the Hydro-Clone system to suppress dust and fumes arising from manufacturing processes and operations in industry.

Dust is separated from the air by a combination of centrifugal force and wet impingement and washing, and



Dust collector operating through centrifugal force and wet impingement

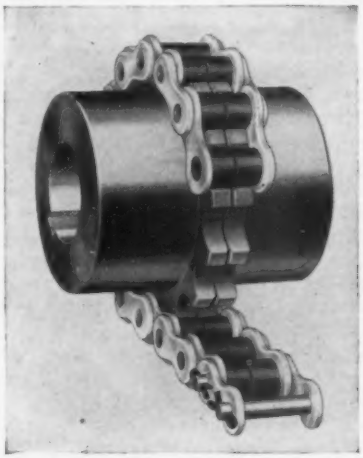
precipitated in the form of sludge in the de-watering tank which is a part of the system. The water is recirculated through the Hydro-Clone thereby wasting no water. This unit will not freeze.

If the dust is to be recovered in a dry form, it is separated in a Sturtevant Dry-Clone which connects with the Hydro-Clone where the fine nuisance dust is suppressed as a sludge. In this way two products are obtained, a large percentage of coarse usable material and a sludge containing all the nuisance dust. To convert all of the dust to sludge, the Dry-Clone is dispensed with.

In handling fumes, smoke, fly-ash and dust at high temperatures, a combination of the Dry-Clone and Hydro-Clone is used. In this case, the Dry-Clone serves as a pre-cooler and a trap for the heavy dust and the air passes to the Hydro-Clone for final cleaning.

Flexible Coupling

LINK-BELT CO., Chicago, Ill., has developed a flexible coupling, type "RCB," which embodies major improvements



Divided roller features flexible coupling

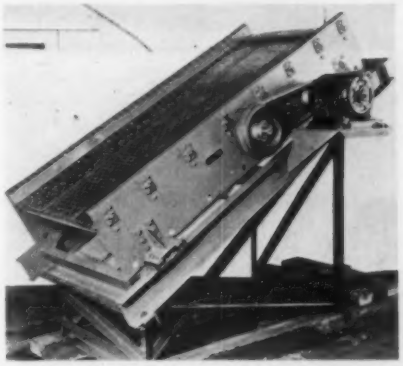
over the company's type "RC" roller-chain coupling long furnished for connecting shafting in line.

The "RCB" coupling consists of two cut-tooth sprocket wheels (or coupling halves) which are connected by a piece of specially constructed single-width finished steel roller chain, using a recently-patented divided-roller feature which combines the advantage of double roller chain with the more rugged and simple construction of single width chain.

The divided roller provides independent roller action for each sprocket, and as the contact between roller and sprocket causes the roller to revolve on its bushing, any tendency to scuff the rollers and sprocket teeth is said to be avoided. Longer coupling life, and extension of the range of efficient application, are claimed for the coupling.

Rubber Mountings Silence Noisy Vibrating Screen

HANSON-WILLIAMSON, INC., Elmont, L. I., New York, has designed and is now producing a vibrating screen which is



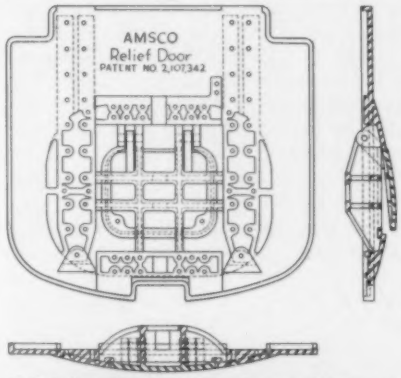
Silence noise in vibrating screen with rubber mountings

practically silent in operation due to the use of rubber mountings.

The new unit weighs approximately 1000 lb. and handles a load of 400 lb. It has a vibrating frequency of about 1000 vibrations per minute. The screen is set up on eight 4-in. long rubber mountings known as vibro-insulators. These mountings, which are a development of The B. F. Goodrich Co., are placed in pairs at each of the four corners of the screen. They are of the double-shear type and have a maximum load capacity of 50 lb. per inch.

Relief Door for Dippers

AMERICAN MANGANESE STEEL DIVISION, of The American Brake Shoe & Foundry Co., Inc., Chicago Heights, Ill., has patented and is now in production on a



Relief door designed to reduce resistance encountered when dipper is lowered into water

relief door for dredge and power shovel dippers.

This relief door is designed to reduce the resistance encountered when a dipper is lowered into water. The new design permits water to enter through a small auxiliary door in the dipper door, operating in a similar manner to a flap valve. When the dipper is filled with material, the relief door is held closed.

The inside of the dipper door is slightly convex, the relief door forming the center portion of the curve. The outside of the main door has double ribs crossing the relief opening and supporting the relief door when it is closed. The hinges and latch mechanism are of the same construction and function the same as on an ordinary dipper door.

Convertible Excavator Has High Leverage Drive

THE HARNISCHFEGER CORP., Milwaukee, Wis., is now in production on a ¾-cu. yd. high speed excavator, which completes the line of from ⅜ to 5 cu. yds. capacities.

Among the advanced features in its design, is a high leverage drive. This

High leverage drive on ¾-cu. yd. excavator

type of drive and method of controlling the operating functions of the machine has been used for many years in other types of material handling equipment, such as overhead cranes and hoists.

Employing the principle used in modern automobiles where high horsepower is transmitted through a small clutch operating at high speed and at low pressure on the clutch discs, the high leverage drive results in increased life of brake and clutch linings and materially reduces the maintenance costs on these elements. The drive is arranged so that the clutches and brakes exert a high leverage on the actual load when driving all the operating parts of the machine. The final gear or sprocket reduction has a relatively high ratio in all cases.

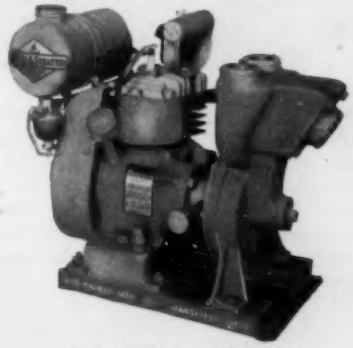
Abrasion-Resisting Screen Cloth

HARRIS STEEL PRODUCTS CO., 420 Lexington Ave., New York, N. Y., has developed a specially treated steel, known as Harristeel, to resist the severe abrasion encountered in screen cloth applications. It is said to be a very tough and hard steel which will resist the fatigue induced in steel by vibrating and revolving screens.

Light Weight Pump

BARNES MANUFACTURING CO., Mansfield, Ohio, has designed a light weight centrifugal portable pump which has an automatic priming feature.

As the pump only weighs 55 lb., it may be carried by hand and set up at



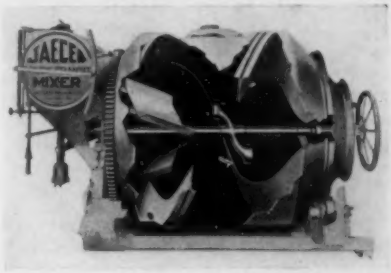
Lightweight portable pump

a moment's notice to act in an emergency as a sump pump to remove water accumulation in pits and quarries after heavy rainfall. It also will be found useful by contractors, builders, and road constructors for similar purposes.

The pump is driven by either a Briggs and Stratton engine or a General Electric motor.

Truck Mixer Improvement

THE JAEGER MACHINE CO., Columbus, Ohio, is now in production on an improved line of truck mixers. The 1939 models for producing transit mixed concrete represent several improve-



Truck transit mixer with dual revolving water sprays and continuous spiral mixing blades

ments in design. It has the short, large diameter and steep cones at both ends, which facilitate mixing and permit a fast discharge without segregation. Another feature is the continuous spiral mixing blades which, it is claimed, provide a thorough mixing action, and, when reversed, a fast, continuous, clean discharge of any slump concrete, up to 20 deg. grade.

Dual revolving water sprays inject water into the mass, clearing a path as they revolve, and also spray into and over the mass in both directions, end-to-end of drum.

NEWS about People

GEORGE B. POORE, JR., has been appointed superintendent of the Calaveras Cement Co., San Andreas, Calif., succeeding R. H. Townsend, resigned. Marion S. Heard has become chief chemist at the San Andreas plant. He succeeds Harold J. Dunton who has resigned.

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J. R. SCHMIDGALL has sold his interest in Nohl and Schmidgall Co., Bloomington, Ill., to Arnold Nohl. The partnership was formed in March of this year to engage in the manufacture of concrete blocks.

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F. H. COMPTON, superintendent of the Valley Forge Cement Co., West Conshohocken, Penn., spoke on the labor situation, particularly as it related to the cement industry, before a recent meeting of the Catasauqua, Penn., Rotary Club.

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Albert E. Frosch, president of the Negley Sand & Gravel Co., East Liverpool, Ohio, recently addressed the Kiwanis Club in Salem, Ohio. His subject was, "Developing a Philosophy for the Cockeyed World of Today."

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H. A. SLICK and W. D. RICKERT, Johnstown, Penn., have purchased the land and plant of the Enterprise Lime and Ballast Co., at Hyndman, Bedford county, Pennsylvania.

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HARRY F. GONNERMAN, manager of the Portland Cement Association research laboratory in Chicago, has been appointed a director of the chemical and metallurgical-engineering section of the Western Society of Engineers.

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A. T. GOLDBECK, engineering director of the National Crushed Stone Association, has been appointed to the executive committee of the American Society for Testing Materials.

•

W. F. NUGENT, vice-president of the Nugent Sand Co., Louisville, Ky., not only believes in the value of the slogan Safety First, but also practices it in his daily life. He has driven an automobile for the past 20 years without an accident, and the same car for nine years. Interviewed at a recent Automobile Show, he said, "I don't see the sense of rushing anywhere. People pass me and yell, 'get out of the way, you,' but when I get to a traffic light, I find them there. They may save five minutes, but what of it? They haven't done anything but jeopardize somebody's life by fast, reckless driving."

Crushed Stone Industry Safety Honor Winners

IN RESPONSE TO A REQUEST by the EDITOR, the following companies have sent in the names of officials who were responsible for winning Safety Awards in the contest sponsored by the National Crushed Stone Association and conducted under the auspices of the Bureau of Mines.

KRAUSE NO. 1 LIMESTONE QUARRY, Columbia, Ill., operated by the Columbia Quarry Co., St. Louis, Mo., for the third successive year won first honors in the contest and was awarded the "Sentinels of Safety" trophy by the EXPLOSIVES ENGINEER (Hercules Powder Co.).

E. A. HEISE, safety engineer and present superintendent of the Krause No. 1 limestone quarry, was credited by President E. J. Krause with having been largely responsible for winning this honor. A description of the safety organization and methods employed by this company in establishing this unusual safety record appeared in ROCK PRODUCTS, May, 1938, pp. 35.

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SOUTH CAROLINA GRANITE CO., Blair Quarry, S. C., operated by Southern Aggregates Corporation, placed second in the contest. Another winner of safety honors was the Raleigh Granite Co., Rolesville Quarry, Wake Forest, N. C., also operated by the Southern Aggregates Corporation. It is also of interest to note that Southern Aggregates had seven quarries competing in this contest, and the frequency rate of the seven quarries was 11.5 and the severity rate was 2.20.

H. M. SHAW, secretary-treasurer of Southern Aggregates Corp., Raleigh, N. C., organized and sponsored the safety work at these plants, starting in 1935. He has also acted as safety engineer, visiting each quarry from time to time and keeping in touch with the safety work. D. E. Saunders, Columbia, S. C., is South Carolina general manager;

E. A. Heise

J. H. Rodgers, superintendent; and R. F. Wolfe, cashier. All of these men have been active in safety work. The Blair quarry of the South Carolina Granite Co. has operated since June 5, 1936, without a lost time accident. The illustration shows the employes of the winning quarry gathered at a barbecue picnic which is given every quarter to the quarry which does not have a lost time accident.

The Rolesville quarry of the Raleigh Granite Co. has operated since July 5,

Blair quarry organization of South Carolina Granite Co., Blair, S. C., responsible for winning safety honors, awarded barbecue picnic

Rolesville quarry group, Raleigh Granite Co., Wake Forest, N. C., another Southern Aggregates Corp., safety winner

1936, without a lost time accident. J. D. Lane is superintendent of both the Rolesville and Greystone quarries. H. C. Burgess and G. L. Burton have served as assistant superintendents at Rolesville during this period. Officers of Southern Aggregates Corp. are: Wallace L. Caldwell, Birmingham, Ala., president; W. T. Ragland, Raleigh, N. C., vice-president and general manager; E. U. Ragland, Raleigh, N. C., vice-president and operating manager; and H. M. Shaw, Raleigh, N. C., secretary and treasurer.

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J. D. HARDESTY is safety director of The Ohio Marble Co., operating The Piqua Stone Products Co., Piqua, Ohio, another winner of safety honors in the National Crushed Stone Association contest. Mr. Hardesty very modestly states that "in the last analysis it isn't the safety director who makes the record but rather the men in the plant." This is the second time this quarry has won the award, and in addition it also has won the Ohio Industrial Commission's award for the quarry industry. In this connection, it is interesting to note that the Ohio Industrial Commission in its latest revision of rates has again lowered the quarry rate, making it about 60 percent of what it was three or four years ago.

J. D. Hardesty

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THE MARQUETTE LIMESTONE QUARRY, located at Cape Girardeau, Mo., and operated by the Marquette Cement Manufacturing Co., was awarded a certificate of merit in the National Crushed Stone Association's Safety Contest, ranking fifth among the 47 open quarries enrolled. In the contest for all quarries sponsored by the Bureau of Mines and the EXPLOSIVES ENGINEER, the Marquette quarry finished in 12th place, winning a certificate of honorable mention. An active safety program was inaugurated in 1924 when the quarry was first opened, and it has operated with perfect safety records during the years 1929, 1930, 1934, 1935, 1936, and 1937. Up to August 1, this year the company has not had an accident and hopes to finish the year with a five-year continuous record. A brief record of the officials who made these records possible is given below:

E. M. Gould

E. M. GOULD, a mining engineer with experience in the Illinois coal fields and the Columbia Quarry Co., was made superintendent in 1924 when the quarry was being developed. He continued as superintendent of the Marquette quarry, taking an active interest in all safety activities, until he resigned on July 1, 1938, to enter the well-drilling business in the Illinois oil fields.

Norman Harwell

NORMAN HARWELL, who succeeded Mr. Gould, started to work in 1926 as quarry timekeeper. After a short time he became a shovel operator and later was made quarry foreman under Superintendent Gould. Mr. Harwell has been very active in promoting the cause of safety.

M. P. GREER, safety engineer for the Marquette Cement Manufacturing Co., supervising all safety activities, started with the company in 1924. During his 14 years with the company he has seen the record for the entire plant improve from one of the poorest in the industry in 1924 to the first place winner in 1928. Since that time perfect records were made in the cement mill and quarry in 1929, 1930, 1934, and 1935. Mr. Greer gives credit for the excellent records to the fine spirit of coöperation of the men and foremen.

M. P. Greer

THE AMERICAN LIME & STONE CO., Bellefonte, Penn., chalked up a fine safety record at its Bell limestone mine and became a winner in the National Crushed Stone Association safety contest. This company is a division of the Warner Co., Philadelphia, Penn. Arthur C. Hewitt, chief engineer, gives credit to the following men for operating during 1937 without an accident: Fred Warner, superintendent; Captain Solomon Koski, mine foreman; Edward Harnish, foreman mine surface; and Charles Keller, kiln foreman. The safety work dates back to 1925. During 1936, 1937, and part of 1938, Charles Keller was chairman of the company's safety committee, being largely responsible for the good record in 1937. Edward Harnish became chairman about March, 1938. Captain Koski, in charge of underground mining operations, has coöperated in keeping a close check on dangerous conditions and practices. Fred Warner, superintendent, has been responsible for supervising the work of the committees and the foreman. He is a son of C. W. Warner.

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NORTH AMERICAN CEMENT CORP., Howes Cave limestone quarry, Howes Cave, N. Y., winner of the certificate of merit for a perfect safety record in 1937, has not had a lost time accident since

J. W. Campbell

March 31, 1932, a remarkable record. Credit for this splendid record is given to J. W. Campbell, superintendent of the Howes Cave quarry, and S. H. Rhodes, assistant superintendent and chairman of the safety committee.

Official personnel, American Lime & Stone Co. quarry at Bellefonte, Penn., responsible for winning safety honors. Left to right, Edward Harnish, foreman mine surface; Capt. Solomon Koski, foreman underground mining; Fred Warner, superintendent; and Chas. Keller, kiln foreman

S. H. Rhodes

Obituaries

HOWARD H. SARLLS, manager of the Mt. Vernon plant, Koch Sand and Gravel Co., Evansville, Ind., died suddenly from a heart attack. Mr. Sarlls was 67 years old. He had been manager of the Mt. Vernon plant for 22 years. Prior to his connection with the sand and gravel company, Mr. Sarlls had been editor and publisher of the Mt. Vernon Republican, a weekly newspaper.

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EDWARD SLOVER, head of the Slover Cement Block Co., Camden, Ohio, died recently at the age of 70 after an illness of several weeks. He had resided in Camden for 32 years and was clerk-treasurer of the Camden Board of Education at the time of his death.

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GEORGE KRONBACH, a veteran quarry man, died on August 27 at the age of 83. He was one of the three organizers of the Monroe Stone Co., Monroe, Mich., now a part of the France Stone Co., Toledo, Ohio.

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R. N. MCDONOUGH, a prominent figure in the steel and crushed stone industry of the South, died recently at the age of 67. Mr. McDonough organized the McDonough Ore & Mining Co., which was later merged with the Alabama Lime & Stone Corp., Birmingham, Ala. He had been identified with the Sloss-Sheffield Steel & Iron Co., Tennessee Coal, Iron & Railroad Co., and Republic Iron & Steel Co.

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FRANK A. STROSHANE, for the past 35 years manager of the Ashland Lime, Salt and Cement Co., Ashland, Wis., died recently at the age of 64.

(Continued on page 77)

Concrete Products
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Concrete Masonry In California

California home with walls of concrete masonry in rough ashlar design, using a special unit having the appearance of stone

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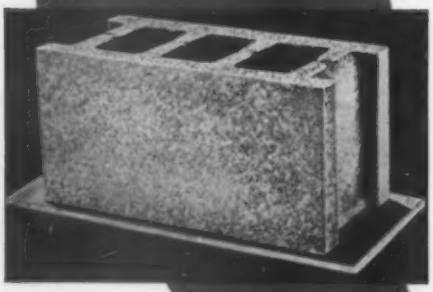

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5, 12, 18, 25, 30, 40, 50 cu. ft. capacities

Besser Batch Mixer with Skip Loader as mounted over Besser Plain Pallet Stripper.

Blades and Sectional Liners made of Wear-Long Metal.

Charles F. Harp, Owner, Louisville, Ky. E. Black, Contractor. Cinder Concrete masonry units manufactured by Worrall Brothers of Louisville, Ky.

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EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

Casting Concrete Tile In Rubber Molds

By BROR NORDBERG

Lee Alloway, manager, who is doing an excellent job of promoting concrete masonry house construction

In the South the concrete products industry has shown a remarkable development during the past few years. Changes that have taken place in some of these plants indicate that an enthusiastic approach has been made in promoting the sale of concrete products for home construction and in the development and introduction of new products.

A striking example of this activity is the work of the Lexington Concrete Products Co., a division of the Central Rock Co., at Lexington, Ky. This concern built a new plant in April, 1936, and at that time its activities were confined to the manufacture of standard concrete and cinder block.

Since that time, the plant has been improved, and several new products have been introduced. There also has been an aggressive campaign to sell concrete houses.

This new plant was built in the yard of the Central Rock Co., close by a source of supply of stone chips and stone sand for the manufacture of concrete block. Cinders are available from a nearby distillery. The plant was equipped with two Anchor machines, one of which has an hourly capacity of 240 standard 8- x 8- x 16-in. concrete units.

Make Variety of Units

Some of the newer units being manufactured are a 4- x 8- x 16-in. load-bearing block, ashlar units, bull-nose block, sash block, precast lintels and pre-cast concrete joists. A vibrating joist machine has been built to manufacture ten 8-in. joists in one operation. All of these units are, of course, necessary to the plant that wishes to develop a market in concrete houses. Low pressure steam curing in the kilns was introduced during the past year. A new power house was built for a 35-hp. boiler which develops the steam for distribution in the kilns. Steam is released through petcocks equally spaced in the 1¼-in. steam lines, which have been placed between the rails for the rack cars so that the heat rises through and around the curing concrete units.

Precast concrete floor slabs, floor tile and wall tile are being manufactured by the process developed by the Superior Cement Corp., Portsmouth, Ohio. The floor tile and wall tile are made in variegated or straight colors, and the slabs are similarly colored or manufactured without colors if tile or other surfacing is to be super-imposed on the slab floor. Wall and floor tile are manufactured in 6- x 6-in., 3- x 3-in., 4- x 4-in., 6- x 12-in. and 12- x 12-in. sizes and the slabs, which are load bearing, are 24-in. square and 2-in. thick, designed for floor slab construction with a 2-ft. concrete joist spacing. Wall tile thicknesses are ⅝-in. and floor tile ⅞-in.

Manufacturing Process

All of these new units are manufactured in rubber pallets and the concrete is placed by vibration. Live rubber, uniform pallets are the medium for producing a glossy surface finish. The 2-ft. sq. rubber pallets for the manufacture of slabs are held in place by a wooden holder, and the smaller tile are multiples which fill a standard wooden holder or frame.

The manufacturing process is quite simple for all these units and involves no costly equipment. The pallets probably represent the greatest outlay. These and the "Coloroc" facing material are furnished by the Superior Cement Corp.

For a straight colored tile, the desired mineral color is mixed with the white quartz and cement to specified proportions and applied in the bottom of the pallet by a trowel. If a mottled design is to be made, the predominating color mixture is placed in its approximate desired position in the pallet and the other color or colors are filled in to cover the bottom of the pallet. An attractive blend of colors is created during the vibration process.

This surfacing mixture is placed to an approximate thickness of ⅛-in. for the smaller tile and ¼-in. for the larger tile and floor slabs. When the coloring matter has been placed fairly evenly over the bottom of the pallet, the pallet holder is placed on the vibrat-

Casting a 24-in. square concrete load-bearing tile in a rubber mold on vibrating table. To the left are color and aggregate pans. Note the display of various sizes and colors of tiles on the wall

ing table which is driven by a 1/3-hp. motor through an eccentric weight on the shaft. The table is very similar to the conventional concrete joist vibrating table except for size and a much reduced amplitude of vibration.

The vibrator is operated until all air bubbles have disappeared and the excess water has risen to the surface. Although it is not a necessary part of the operation, the practice is to then sprinkle portland cement over this wet surface to take up some of the excess moisture before applying the backup, or bulk, of the concrete. This concrete is a stiff mix of graded stone sand and high early strength portland cement, when making the smaller tile, and for the larger slabs consists of stone sand, ½-in. minus stone chips and high early strength portland cement.

This concrete backing is placed by trowel to the approximate thickness required, and the whole is again vibrated until all air bubbles have disappeared and the concrete has settled at a horizontal plane. The top is struck off by a wooden float and the unit is ready for curing. The vibrating operation takes about 1½ minutes. The amplitude of vibration is increased and the frequency is decreased when manufacturing the thicker units.

As was pointed out earlier in this article, the floor slabs are available with a colored facing, without coloring if it is desired to place floor tile or other wearing surface over them, or they may be surface pointed. Each of the four sides has an indentation or groove to allow for the placing of ¼-in. round reinforcing rods in the mortar when placing the floor slabs.

They are designed for installation with standard precast joists placed on 2-ft. centers with spacers between. Two ¼-in. steel reinforcing rods are placed in each slab during the manufacturing process and five similar rods in the opposite direction to resist tensile stresses.

All slab and tile units are cured by a combination of heat and moisture. The units are covered in their trays by a tarpaulin which also covers a section of the steam main from the steam boiler. A flow of live steam is released within the tarpaulin through a petcock. Curing is done overnight and the pallets are stripped the following morning.

In order to make pallets available for frequent re-use, high early strength portland cement is used exclusively and by its use there has been a minimum of broken edges and corners. After stripping, the rubber pallets are washed with ordinary soap and water and are then ready for re-use. It is essential for a smooth even tile surface that the pallets be absolutely clean. Care is taken not to expose them unduly to sunlight and heat in order to preserve the resiliency of the rubber in the pallets.

Concrete house built at Versailles, Ky., with units furnished by Lexington Concrete Products Co., Lexington, Ky. This is one of the homes which has promoted the use of concrete masonry

Plant and yard, with curing kilns and storage on the left. To the right is the new boiler plant installed for steam curing

These units are finding wide acceptance, and are being sold mainly for construction in new homes built of concrete masonry. Since the company erected its model house early in 1937, nine concrete masonry houses have been sold in Lexington, all of which have colored concrete floor tile, concrete slabs, bathroom wall tile or kitchen floor tile. The addition of these new products has given the company a greater proportion of the total outlay for home construction, and the floor slabs have turned business to the company that ordinarily goes to the contractor in the form of poured concrete floors.

Model House Brings In New Business

The model house, which helped to stimulate concrete house construction in Lexington, is a four-room structure which could be duplicated at a cost of $4200. It featured a coursed cinder block exterior, 8-in. concrete joists, precast slabs, colored floor tile and wall tile. The exterior was painted with white portland cement paint.

A private showing was held for architects, contractors and builders. Several local architects are now advocating concrete masonry house construction since the model house was placed on display. An advertisement was carried in the local paper announcing the formal opening. The response was unusually good, and to this house many worthwhile prospects could be traced. Lee Alloway, manager of the company, now occupies the building with his family and holds "open house" to anyone wishing to inspect a concrete house.

Since the opening of the model house, an aggressive campaign has been planned, which bids fair to develop a very profitable concrete business in 1938. Advertising and promotion is designed

to put across the desire for concrete houses and not to emphasize the concrete units. Good returns are secured from direct mail, and many good prospects are derived from leads furnished by the Portland Cement Association which developed from its national advertising program. "But," says Mr. Alloway, "our best prospects are the friends of those living in concrete houses."

Bricks Made from Tripoli

IT IS REPORTED that a new industry is developing in Quincy, Wash., in which diatomaceous earth or Tripoli is used in making bricks. The material is very light as compared with concrete or ordinary clay bricks. It is said that the cost of production is about the same as for concrete block.

Gravity Type Plant for Concrete Products

BLAIRSVILLE CONCRETE PRODUCTS CO., Blairsville, Penn., is now building a new type structure for the manufacture of concrete blocks and other items. The building is so arranged that gravity will be depended upon for the handling of raw materials to the finished product. The "vertical mill", as it is called, will be 12- x 36- x 65-ft., and will contain large storage bins and modern machinery. Materials will be loaded directly from railroad cars into bins. Just recently the company erected a modern factory for the manufacture of concrete burial vaults.

Color Analysis of Concrete

A STUDY OF CHANGES in color in portland cement concrete has been made by W. M. Dunagan, associate materials engineer, Iowa Engineering Experiment Station, Iowa State College, which has been published in a well-illustrated, 40-page bulletin, No. 139.

One of the conclusions drawn from this study was that the tendency of concrete to fade can be offset by inadequate curing (not recommended) or by the use of excess pigment. It is also pointed out that desirable tints or shades of color can be produced by the choice of suitably colored fine aggregate, especially if this be rather soft, crushed material.

ORNAMENTAL STONE CO., Charlotte, N. C., manufacturing cinder and superock blocks and other concrete products, has found it necessary to increase production, according to a local report. The company also produces cut stone and ceiling blocks. In addition to its Charlotte plant, another unit is located at Raleigh. W. F. McCanless, general manager, has been in the cut-stone and concrete masonry business for nearly a quarter of a century.

Concrete Trays For Seed Germination

ANOTHER MARKET for concrete products is suggested by the use of reinforced concrete trays by greenhouses or horticultural laboratories to germinate seeds. In the past wooden or earthenware trays have been used, but in a comparatively short time trays made of these materials decay or become broken, necessitating their frequent renewal. Perforated reinforced concrete trays should therefore come into more general use.

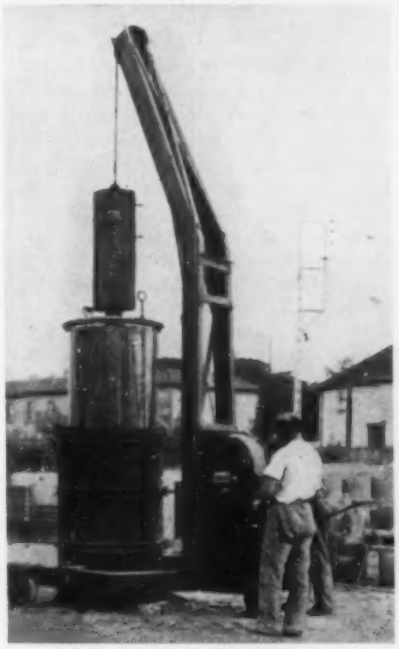
Ready-Mixed Concrete Plants Expand

NUGENT SAND CO., Louisville, Ky., is installing bulk cement bins and batching equipment for transit-mixed concrete. The company has purchased two 3-cu. yd. Rex transit mixers on G. M. C. trucks to supplement those operated by contractors who desire ready-mixed concrete.

COLONIAL SUPPLY CO., INC., Louisville, Ky., has a federal contract to furnish 4,500 cu. yd. ready-mixed concrete for construction work to be done by the government at Fort Knox, Ky. A 1-cu. yd. central mixing plant has been constructed at the site and six of the company's 24 truck mixers will be used in filling the contract.

New Method of Vibrating Concrete Pipe

In France, a new method of vibrating concrete pipes is now in use for large diameter sizes in lengths up to 60 in. A small movable crane manipulates the core which vibrates the concrete, according to an account of the new



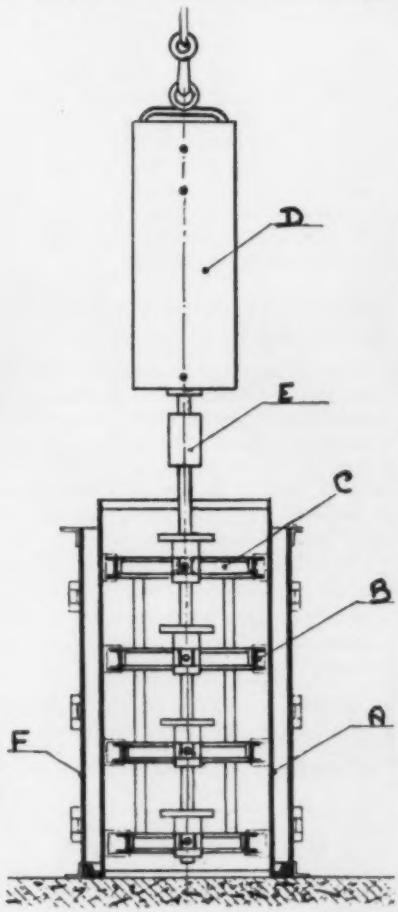
Vibrator is raised and lowered by hand winch on portable crane

equipment appearing in Concrete Building and Concrete Products, London, England.

As shown in the illustration, the vibrator consists of a central shaft (E) vibrated by an electric motor contained in a housing (D). Within the core (A) is a series of horizontal annular discs (C) which are vibrated by the shaft passing through their centers. The discs in turn rest in channel-iron supports (B), on the inner face of the core. This core is vibrated and the vibrations are transmitted to the concrete. Core (A) is of sheet steel with a sliding sector-shaped piece at one side so that it may be removed easily when the pipe is made. The outer mould (F) into which the core and vibrator are lowered consists of a thin inner shell and a heavy outer one. This inner shell is hinged in halves and is made of thin sheet iron without stiffening, and it fits closely within the outer mould without any intermediate space. The outer mould is also made in halves and hinged, but is of heavy sheet steel strengthened by channel irons.

In making pipe, the vibrator is started when the core is in place and the concrete is poured into the space between the core and the mould. The top is trowelled after filling, and the core is then removed after pulling out the sector-shaped piece. The heavy outer shell of the mould is also removed, leaving only the thin inner shell which prevents the pipe becoming deformed before the concrete has hardened.

Another illustration shows the crane handling the core and vibrator, being



Showing details of concrete pipe vibrator

moved into place by hand. The vibrator is raised and lowered by a hand winch.

The Consolidated Cement Corp., Chicago, Ill., which owns a cement plant at Mildred, Kan., that has not been operating for some time has been notified that the Kansas State Tax Commission has reduced the valuation of the plant for tax purposes. A new valuation of the property is set at $35,000. It had been assessed locally at $72,750.

Koenig Incorporates

Incorporation papers were recently filed with the Secretary of State for Ohio by William F. Koenig Co., Cincinnati, Ohio, a long-established concrete products manufacturer. The capital was listed as 250 shares of no par value. William F. Koenig, founder of the original proprietorship, will be president of the newly incorporated company; Mrs. Koenig will be treasurer; Emil Koenig, a son, vice-president; and B. Harvey Dale, attorney, secretary. Three other sons are also actively interested in the company, namely, William G., Walter, and Herbert Koenig.

Specialize in Downspout Concrete Pipe

Houston Concrete Pipe Co., Houston, Texas, is making a self-centering concrete pipe, stocks of which range in size from 4 to 15 in. Larger sizes are made on order. President W. B. Dixon, describing the pipe, said, "This self-centering feature eliminates the necessity of building up in the hub for the proper grade and it permits a smooth finish inside the pipe." The company is specializing in downspout drainage, their No. 2 pipe being made particularly for this service.

New Block Manufacturer

George Turner and James F. Webb, Seaford, Del., have erected a modern concrete block manufacturing plant on the Webb property south of Blades. Operations were started late in August with new machinery. The new firm will be known as Webb and Turner.

To Open Pipe Plant in Youngstown

Universal Concrete Pipe Co., with nine plants in Sandusky, Cleveland, and Columbus, Ohio; Pittsburgh, Penn.; Binghampton, Rochester, Syracuse, and Elmira, N. Y.; and Atlanta, Ga., will soon open a new plant at Youngstown, Ohio. This company makes pipe ranging in size from 6-in. to 108-in., and weighing from 70 lb. to 10,000 lb. each. Three types of pipe are made: dry mix pipe up to 36 in. in diameter; moulded pipe from 36-in. to 108-in.; and reinforced pipe.

Sherman Concrete Pipe Co., is establishing a new plant representing an investment of $25,000 in Birmingham, Ala., to make concrete pipe ranging from 4-in. to 108-in. in diameter. According to T. A. Fagaly, the company manager, all raw materials will be purchased in the Birmingham district and the products will be distributed throughout North Alabama. The plant will be at 3240 Fayette Ave., the site formerly occupied by Weaver Concrete Pipe Co.

Float entered in Pioneer Day parade has miniature concrete barn, silo and house

Attractive Float Advertises Concrete Products

THE MARIETTA CONCRETE CORP., Marietta, Ohio, made a hit in the Pioneer Day parade with the float shown in the illustration, and incidentally secured some excellent advertising. A concrete barn, silo and house, in miniature, were mounted on the float. The Pioneer Day celebration was in honor of the 150th anniversary of the founding of Marietta, the first permanent settlement in the old Northwest territory.

Utilizing Gypsum and Anhydrite in Cement

IT IS OF INTEREST to cement technologists to learn that the U. S. Bureau of Mines investigators have determined, through research, the extent of the value of anhydrite as an addition to cement. Anhydrite, the anhydrous form of calcium sulphate, inevitably occurs associated with gypsum, and the percentage varies widely depending on the nature of the deposit and the depth of working, states the Bureau report.

When used alone anhydrite has a definite effect but is less effective than pure gypsum as a retarder; about four times as much pure anhydrite as pure gypsum of equal fineness is required to produce the same retardation. Although anhydrite is intrinsically less effective than pure gypsum, yet mixtures of anhydrite and gypsum can be as effective as pure gypsum, and, under suitable conditions, mixtures that contain 25 to 50 percent anhydrite should be as effective as pure gypsum.

An investigation of the problem was undertaken several years ago by the Non-metals Division, Bureau of Mines, at its eastern Experimental Station, College Park, Md. The first study was concerned with the chemical behavior of calcium sulphate in relation to time of setting. As a result of this study, chemical relations were revealed and the important effect of catalytic amounts of water vapor was recognized.

Effectiveness of anhydrite relative gypsum was investigated as regards setting, tensile strength, and compressive strength. An important phase of the study was the conditioning of the materials so that they absorbed slight amounts of water vapor such as, in all likelihood, they would in plant mill practice. Copies of the technical paper No. 578, "Relative Value of Gypsum and Anhydrite as Additions to Portland Cement," by P. S. Roller and M. Halwer, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a price of five cents.

IRON LETTER-BOXES will be replaced with concrete pillar-boxes, according to a decision of the Japanese Communications Ministry. Thousands of tons of scrap metal will be made available for munitions and other essential uses by this action. An abundant supply of cement is available in Japan but a large part of its metal supply must be imported.

Convert Rotary Kilns

(Continued from page 45)

throughs are raised by a 70-ft. bucket elevator to a new 100-ton bin, from which the lime is drawn for shipment or for sizing over a small Allis-Chalmers enclosed double-deck vibrating screen.

Minus ⅛-in. lime is removed through this screen for shipment by truck or rail or is delivered to the hydrating plant by truck. Intermediate sizes are loaded into cars by a portable conveyor (18-in. belt) 28-ft. centers, followed by a second one on 14-ft. centers in the car, or are elevated by a Redler conveyor, 50-ft. centers, to a 50-ton bin. Capacity of the lime plant for rotary and shaft kiln lime is 260 tons per day.

The Louisville Cement Co. also operates one of the largest commercial stone plants in southern Indiana at Milltown. Stone aggregate is washed, but improvements are being made to further insure the cleanness of the stone product. An Allis-Chalmers scrubber attachment of the type commonly used in the mining industry has been installed on the Allis-Chalmers centrifugal screen now in operation.

Portable Plants Barred In Indiana

THE STATE HIGHWAY COMMISSION of Indiana has barred sand and gravel producers who operate portable plants, which may be shipped to any section of the state to work deposits, from competing on state road jobs.

Adoption of the regulation by the commission was made "supplemental to the standard specifications" providing that:

"The mineral aggregates (sand and gravel) required in the construction of this contract shall be produced in plants with adequate equipment. The plants shall have been located at an acceptable deposit and shall have been in operation for a period of not less than 90 days prior to the time of advertisement of the contract.

"Floating plants on navigable streams will be considered as meeting the above requirements if they shall have been in operation for a period of not less than 90 days prior to the time of advertisement on this contract."

CHARLES AND HERMAN SPITCAUFSKY will dismantle the gravel plant at Bagnell, Mo., and will sell the equipment and materials. The plant was purchased in August from Mr. and Mrs. Wheat of Texas, Okla. Charles Spitcaufsky is owner of the Banner Coal Co., Barnett, Mo., and Herman is in the wrecking business in Kansas City.

Wage Minimums Bring Protest

Protests against the application of minimum wage rates have been lodged with the Public Contracts Board, Department of Labor, by cement manufacturers in Louisville, Ky., Birmingham, Ala., and Kenova, W. Va. The names of companies making the protest were not revealed. The proposed minimum wage which the Board is attempting to place in effect for cement plants having government contracts is 57c an hour for West Virginia, 50c an hour for Kentucky, and 40c an hour for Alabama.

According to the Public Contracts Board, most replies to the questionnaires sent out were favorable to the suggested wage schedules. The larger cement companies whose operations extend over a wide area have not lodged any protest over the minimum wages set by the Board. One leading corporation, however, has written a letter to the board requesting an opportunity to participate in any hearings which may result from the complaints filed by other members of the industry. A 48-page report was prepared showing how the proposed prevailing minimum wage rates were determined.

The hourly minima recommended for the seven districts is as follows:

Pennsylvania, New York, New Jersey, Maryland, West Virginia, Ohio, Delaware, Massachusetts, Connecticut, Rhode Island, Vermont and New Hampshire, 57c; Maine, 45c; Michigan, Indiana and Kentucky, 50c; Illinois, 63½c; Wisconsin, Minnesota, Iowa, Missouri, 55c.

South Dakota, Nebraska, Kansas, North Dakota, 50c; Colorado, Wyoming, Utah, Montana, Idaho, Oregon, Nevada, Arizona, New Mexico, 55c; Washington, 65c; California, 62½c; Oklahoma, Texas, Arkansas, 43c; Louisiana, Alabama, Tennessee, Virginia, Georgia, Florida, Mississippi, North Carolina, South Carolina, 40c.

Minimum wages were determined on the basis of rates prevailing in 12 regional divisions in the industry established by the Bureau of Mines. These districts are groups of states which are held to be related geographically and commercially. These districts are as follows: (1) Eastern Pennsylvania, New Jersey and Maryland; (2) New York and Maine; (3) Ohio, Western Pennsylvania and West Virginia; (4) Michigan; (5) Wisconsin, Illinois, Indiana, and Kentucky; (6) Virginia, Tennessee, Alabama, Georgia, Florida and Louisiana; (7) Eastern Missouri, Iowa, Minnesota, and South Dakota; (8) Western Missouri, Nebraska, Kansas, Oklahoma, and Arkansas; (9) Texas; (10) Colorado, Montana, Utah, Wyoming, and Idaho; (11) California; (12) Oregon and Washington.

The report points out that the industry is widely scattered over the United States, there being only 13 states in which no cement plants are to be found. Of primary importance as an influence upon the location of the plants is the fact that cement is a heavy product and it is low in value in relation to its weight. Freight rates are an important item of cost and exert an influence toward the dispersion of the industry throughout the country. It is estimated that the limit to the shipping radius of a cement plant is 300 miles.

New Crushing Facilities for Agricultural Stone

KENTUCKY STONE CO., Louisville, Ky., has placed in operation a new auxiliary crushing plant in the quarry operated at Mt. Vernon, Ky. The new unit was installed primarily to make agricultural stone, but can also produce stone in commercial sizes to fill small orders and to supplement that handled through the regular plant when it is operating at capacity, or is down for repair.

The auxiliary plant consists of a No. 6 Telsmith primary breaker which will crush to 1½ in. minus; a Simplicity 4- x 8-ft. double-deck, vibrating screen; and a No. 70 J. R. Day pulverizer. The primary crusher has been placed in a cut in the quarry face about 70 ft. above the quarry floor, and stone for this plant is being quarried above the crusher an additional 20 ft.

Delivery to the crusher is made in small, industrial side-dump cars, hand-operated. The crusher discharge is chuted to the vibrating screen, which is directly over a small bin partitioned for truck loading on the main quarry floor.

In producing commercial stone the Day pulverizer is set accordingly, the screen bars being set closer on agstone. The pulverizer product either can be put directly into trucks or can be stockpiled over a belt conveyor. In producing agricultural stone, using one screen deck, the feed is about 1½-in. to the pulverizer, which will then have an output of 15 to 30 tons per hour through ½-in. screen bars. The pulverizer is driven off a 100-hp. G. E. synchronous motor by Browning V-belt.

COLUMBIA QUARRY CO., Krause, Ill., expects to place in service early in September a fleet of Easton Model RP-10 semi-trailers which will replace trackage and cars in quarry haulage.

NEWS of the month

Work Started On Alsen Cement Plant

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., has started rebuilding and modernization work at the Alsen, N. Y., plant which has been idle for many years. Concrete is being poured for 20 large silos and a new stock house is to be built to replace the one that has been torn down. Surveys have been made for a new overhead tramway which will convey rock from the quarry. Some of the old and now obsolete buildings will be removed and modern structures erected. The plant will be entirely re-roofed, the interiors torn out, and a modern layout installed. A large amount of heavy machinery will be installed, replacing much of the old equipment.

U. S. Gypsum To Build Florida Plant

PLANS are now under way by the United States Gypsum Co., Chicago, Ill., for the construction of a modern plant at Jacksonville, Fla. The property is situated adjacent to docks where company boats will deliver gypsum rock from the company's quarries in Nova Scotia for the manufacture of a complete line of gypsum boards, gypsum plasters and other gypsum building materials. Operation will be continued at the established plant at Plasterco, Va., but the new plant at Jacksonville will provide the additional capacity which the growth of Southern business is making advisable. Other plants in the South are located at Sweetwater, Texas, Southard, Okla., and an insulation board plant at Greenville, Miss. All told, the company operates 55 mills and warehouses.

Oklahoma Increases Freight Rates On Aggregates

PARTIAL INCREASES on intrastate rates on sand, gravel and crushed stone have been granted Oklahoma carriers by the Oklahoma State Corporation Commission.

Under the commission's order, in harmony with recent increases ordered by the I.C.C., no increase was granted for distances less than 60 miles. For distances up to 200 miles, the commission granted increases of six cents per ton for each 10-mile block in excess of 60 miles where the haul is only via one line. For distances in excess of 60 miles, but not exceeding 150 miles, the commission authorized increases of 16c per ton, and for distances in excess of 150 miles, but not exceeding 200 miles, the commission gave authority for an 11c increase for joint line application.

Stone Company Makes Rock Wool

KENTUCKY STONE CO., Louisville, Ky., operator of a number of commercial stone plants throughout Kentucky, is completing construction of a new rock wool plant at its Mullins, Ky., stone plant. At this location the stone is said to be of ideal composition for the manufacture of a good wool. Stone will be treated in a cupola fired by coke.

Operating New Quarry

ERIE STONE CO., Indianapolis, Ind., has been operating from its new quarry west of Wabash, Ind., since May. The new plant has been built largely from equipment taken from other plants operated by the company. It has a capacity of about 80 tons of crushed stone per hour. Stone is trucked from the quarry to the crushing plant.

Cement Plants Open for Production

ALPHA PORTLAND CEMENT CO., Manheim, W. Va., plant has resumed operations after a two-month shutdown with approximately 125 men returning to work.

UNIVERSAL ATLAS CEMENT CO., Independence, Kan., plant reopened September 1 for an indefinite run. According to a local report, the plant will operate only about 25 percent of capacity.

CONSOLIDATED CEMENT CORP., Fredonia, Kan., resumed operations September 1, with a full force of 125 men. The plant had been closed for a month to make repairs.

ASH GROVE LIME & PORTLAND CEMENT CO., Chanute, Kan., plant has started up operations after having been closed since July 28.

LEHIGH PORTLAND CEMENT CO., Metaline Falls, Wash., plant resumed operation September 1 and is now in full production. It is anticipated that the plant will be kept in operation most of the fall and winter. Orders for Grand Coulee dam are expected to take a large part of the production.

Cement Plant In Temporary Shutdown

LONE STAR CEMENT CORP., Hudson, N. Y., plant has been shut down temporarily with bins full. The plant has been running continuously since early spring. It is expected that operations will be resumed the first of October.

Eastern Cement Orders Show Increase

THREE CEMENT AWARDS totaling $671,775 were recently placed by Federal agencies with Pennsylvania cement plants. The Whitehall Cement Manufacturing Co., Cementon, Penn., was designated to fill the largest contract for $574,800 awarded to John A. McCarthy & Co., Inc., Bronx, N. Y. Two other cement contracts, each for about $48,500, will furnish work for the following companies: Alpha Portland Cement Co., Martin's Creek; Universal Atlas Cement Co., Northampton; Pennsylvania-Dixie Cement Corp., and Keystone Portland Cement Co., Bath; Lone Star Cement Corp., Nazareth; and Lehigh Portland Cement Co., Ormrod and Sandts Eddy. The Treasury and the WPA made all the cement purchases.

Lime Plant Purchase

ENTERPRISE LIME AND BALLAST CO., Hyndman, Bedford county, Pennsylvania, has been purchased by H. A. Slick and W. D. Rickert, 618 Pine St., Johnstown, Penn. They will operate the plant, after making the necessary repairs, producing building stone, quick lime, and pulverized limestone for agricultural use. The Geological Survey shows a large quantity of Helderberg limestone is readily available.

THE OZARK AGRICULTURAL LIMESTONE CO., Johnson, Ark., is a new lime company which has been started by C. Brantingham and Burl Cardwell, partners in the undertaking. It is said that the new company will not be in direct competition with the Ozark White Lime Co., since the new company plans to make their products from the spalls or smaller stone.

KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, has completed improvements costing approximately $50,000 at the Gibsonburg lime plant. The remodeled kilns are now in production with 30 men employed.

Cement Company Ordered to Deal With CIO

COWELL PORTLAND CEMENT CO., Cowell, Calif., was ordered by the National Labor Relations Board on September 7 to abrogate its contract with the Lime and Cement Employes Union, an affiliate of the AFL. The board also ordered the company to bargain collectively, upon request, with the International Union of Mine, Mill and Smelter Workers of America, a CIO affiliate. It also held that the company's action in closing its plant July 16, was a lockout of employes to avoid bargaining with the workers rather than a seasonal shutdown and has ordered the company to reinstate with back pay the "locked out" workers.

Company officials have declined to comment on the case, but Russell Roberts, Contra Costa County vice-president of the State Federation of Labor, is reported to have said, "The plant now is 100 percent AFL. We'll do everything within our legal power to keep it just that way."

Longest Conveyor Belt For Grand Coulee Dam

AT GRAND COULEE DAM in Washington there is now in operation what is believed to be the largest conveyor belt ever manufactured. Operating on 4850-ft. centers, the gigantic belt measures 9700 ft. long. It is 48 in. wide and of eight-ply construction, and required 30 tons of cotton and 50 tons of rubber for its manufacture.

The conveyor belt, made by the Mechanical Goods division of Goodyear Tire & Rubber Co., Akron, Ohio, conveys coarse stone 6-in. and minus, comprising the aggregate for the huge dam which will span the Columbia river, a distance of approximately one mile from the source of damsite destination. A flow of 2000 tons per hour of aggregate is required by the contractors for the project. Supplementing the main conveyor are some additional 20,000 ft. of vari-sized belting used to gather, classify, store, reclaim and transport the aggregate through the screening and washing plant located at the source of the material.

Gravel Bunker Collapses

WASHOUGAL RIVER GRAVEL CO., Oak Park, Wash., suffered the loss of a bunker containing 400 tons of gravel and crushed rock when it collapsed without warning. Tangled up in the wreckage was a 150-hp. motor, a 25-hp. motor, numerous screens, elevators and other equipment.

C. W. Tidland, owner of the gravel company, could not explain the reason for the collapse. Strangely, while one section of the structure had a tendency to lean, the bunker fell in the direction opposite to where the supports were weakest. One theory was that someone stealing gravel at night had struck one of the timbers with a truck. The bunker and crusher will be rebuilt, but the equipment may be moved to Columbia, Wash., where sand is being taken out of the river. Mr. Tidland had contemplated dismantling the bunker in about a year.

Texas Sand and Gravel Plant Is Busy

THE TEXAS SAND & GRAVEL CO., INC., organized in Waco, Tex., in 1920 by L. D. Eastland and his two sons, W. E. and Roy, has been very busy this fall supplying material for surfacing 165 miles of Panhandle road. Roy Eastland is in charge of the Amarillo, Texas, office. This company operates a modern screening and washing plant about 30 miles from Amarillo on the Fort Worth and Denver railroad. It is expected that a double shift of 36 men will be needed to operate the plant to capacity.

Erect Lime Putty Plant

LOUISVILLE LIME MORTAR CO., Louisville, Ky., has completed erection of a standard two-tank Brooks-Taylor aged lime putty plant in Louisville. Putty as well as mortar will be available for delivery in ready-mixed concrete trucks. The company was recently organized by three building supply concerns, all of which are engaged in the ready-mixed concrete business.

H. K. Williams is president; George Bickel, treasurer, and B. H. Collings, vice-president and secretary. When the plant is completed and in operation, local builders, architects and contractors are to be invited to inspect the new unit and its products.

Revamping Plant for Mining Operation

KENTUCKY STONE CO., Tyrone, Ky., plant has been revamped considerably during the past year and at present is undergoing an extensive change in delivering stone to the primary crusher. Until last year, stone was quarried from a ledge several hundred feet below the screening plant, which is located on a high bluff overlooking the Kentucky river.

Stone is now being mined into the face of the quarry and is being taken out directly under the plant. The primary crushing plant, formerly located on the quarry floor, has been moved adjacent to the screening plant on the bluff above. At present, stone is hauled out of the mine by International Harvester trucks and dumped into skip cars which are hoisted some 1,000 ft. to the primary crusher.

At this writing, a vertical shaft almost 300 ft. in depth and 6- x 20-ft. in cross section is being driven from the plant above into the mine. When the shaft is completed, a skip bucket arrangement will be employed to raise the stone directly into the primary crusher. This will eliminate the incline hauling system and will confine the trucks' hauling range within the mine onto a hopper at the bottom of the shaft. Improvements that have been completed already have increased the plant capacity to 1000 tons in 10 hr. —double the capacity when the primary crusher was on the quarry floor.

Tractor and scraper used to strip overburden at the Crystal Silica Co., Los Angeles, Calif., are also employed to haul the sand to the washer. This equipment operates 17 hr. a day with a fuel consumption of 1.3 gal. per hour, the fuel costing 6 cents per gal., and the daily haul totalling 300 miles

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THE QUARTZITE STONE CO., Lincoln, Kans., has been active this fall supplying crushed stone for highways.

Prices Bid—Contracts Let

ELYRIA, OHIO: Townships and villages in Lorain county improving roads under the county's blanket $1,702,000 WPA project will buy stone from the Cleveland Quarries Co., operating Amherst quarries. They will purchase 6540 cu. yd. of stone for 15c per cu. yd.

GRINELL, IOWA: Board of Supervisors of Poweshiek county, coöperating with the Iowa Emergency Conservation Works, is buying agricultural limestone for resale to farmers. Contracts have been signed with two quarries to furnish the limestone at the quarry for 75c per ton. One contract was with the Concrete Materials Co., Cedar Rapids, Iowa, for their quarry in Keokuk county, and the other was with the Le Grand Limestone Co., Chicago, Ill., for their quarry north of Le Grand, Iowa.

QUINCY, ILL.: The WPA has started work on 106 miles of gravel roads in Melrose, Riverside, Camp Point, Ursa and Gilmer townships, calling for an expenditure of nearly $2,000,000. A program laid out by the Better Highways Association calls for the construction of 476 miles of gravel roads that will lead from every farm house to market.

NEENAH, WIS.: Bids from three companies for the sale of 1300 cu. yd. of gravel to the city of Neenah were recently opened. The bid of Courtney and Plummer at 78c a cu. yd. was accepted. The other bids received were from Landwehr and Hackl at 84c a cu. yd., and from Quarry Products Co., for crushed stone at $1.35 a cu. yd.

BAKERSFIELD, CALIF.: Contract has been awarded to Stroud & Seabrook, Bakersfield, Calif., at $10,550 for 5000 ft. of 30-in. concrete sewer pipe for the first work on the new city sewage plant.

PINEVILLE, MO.: The Lewis County Soil Conservation Association recently contracted with a quarry to furnish 9000 tons of agricultural limestone at $1.50 a ton for distribution to its members.

DELPHOS, OHIO: Delphos Quarries Co., Delphos, Ohio, was awarded a contract to furnish an unspecified amount of stone to the municipality for 60c, 80c, and 90c a ton, according to quality and size.

CHATSWORTH, ILL.: The Churchill Gravel Co. has been awarded the contract to gravel a highway at Weston at a bid of $1.33 cu. yd. for gravel distributed on the road.

AUSTIN, TEXAS: Colorado River Authority has under advisement five identical bids for Tom Miller dam submitted by Longhorn Portland Cement Co., Oklahoma Portland Cement Co., Lone Star Portland Cement Co., Universal Atlas Cement Co., and Trinity Portland Cement Co., at $225,000 each on 105,000 bbl. of cement at $2.19 each and 54,000 sacks at 66c each.

Building Materials Cost Less

PRICES OF BUILDING MATERIALS in the Cleveland area are considerably lower than they were in 1929, stated William T. Rossiter, president of the Cleveland Builders Supply Co., in answer to statements that materials cost more today than they did in 1929. He pointed out that the total cost for hard materials for a brick house 24- x 26-ft. costs $661.80 (excluding the sales tax) while in 1929 the same amount of material cost $863.50. The Builders' Exchange reported that for a $6000 brick house with back-up tile, 17½ bbl. of cement, 43 tons of sand and gravel, 6 tons of plaster, 100 sacks of lime, and a half barrel of plaster of paris were required. Wallace Dunbar of the Dunbar Co., which keeps an index on material costs, said that a total materials index, including hard materials, lumber, steel and labor, was 158 for 1929 and 147 for this year.

International Cement Congress In Stockholm

STOCKHOLM, SWEDEN, was host recently to the first international congress on the advanced chemistry of cement. Eleven countries were represented by 50 delegates.

R. H. Bogue, research director under the Portland Cement Association Fellowship at the National Bureau of Standards, Washington, D. C., was one of those who represented the United States. His paper, "Constitution of Portland Cement Clinker", traced the history of the use of the X-ray and microscope in studying the compounds of cement.

W. Bussem of the Kaiser Wilhelm Institute for Silicate Research, Berlin, discussed the results of X-ray research in cement compounds and their hydrates. He also pointed out suggested improvements in the accuracy and sensitiveness of X-ray analysis as applied to crystal chemistry.

"Effect of Water on Portland Cement" was the title of a report by Prof. P. Schlapfer of the Technical University, Zurich, Switzerland. This paper discussed the reaction in Portland cement clinker which occur on contact with water and debated the influence on cement of temperature, grain-size, amount of water and time of storing.

S. Giertz-Hedstrom, director of the congress, had a paper on "The Physical Structure of Hydrated Cement," in which he presented the results of laboratory investigations of methods of hardening concrete and the physical and chemical backgrounds of the different hardening processes.

Other papers included: "Reactions of Aluminous Cement with Water," by Dr. Gunnar Assarsson of the Geological Survey of Sweden, and "The Mineral Content of Aluminous Cement," by Nils Sundius of the Survey, which summarized historical development and the present status of research in the properties of high alumina cement.

Collusive Bidding Charge by F.T.C.

CHARGING COLLUSIVE BIDDING and price-fixing, the Federal Trade Commission recently issued an order against 41 associations of dealers affiliated with the National Federation of Builders Supply Associations. Setting forth 10 practices allegedly violating the Trade Commission Act, the order is now in force, having gone uncontested for the 60-day period provided by statute for court appeal. Affected by the order are the Building Material Institute of Cleveland and the Ohio Builders Supply Association, members of the federation, and the Allied Construction Industries of Cleveland, Inc., a non-affiliate.

The Commission also has cited 75 cement companies, alleging collusive bidding and monopolistic practices on which hearings have continued for over a year.

Open Quarry for Grand River Dam

THE GRAND RIVER DAM AUTHORITY which is in charge of the federal dam project near Vinita, Okla., will open a large rock crushing and screening plant to supply aggregates. Massman Construction Co. will be in charge of this work. According to local reports, the plant will have a capacity of 1800 cu. yd. daily and 50 men will be employed. Concrete mixing and batching plant will have a capacity of 2000 cu. yd. daily.

DOUDS QUARRIES, INC., Ollie, Iowa, has been producing agricultural limestone for Jefferson county, Iowa, farmers. The price per ton at the quarry is $1.01.

PORTSMOUTH SAND & GRAVEL CO., Portsmouth, Ohio, will increase its office facilities at the foot of Third street.

Obituaries

(Continued from page 64)

H. L. TARBOX, president of Tarbox-McCall Stone Co., Findlay, Ohio, died recently at the age of 80. He had been in the crushed stone business for 50 years—40 years at the present location. Mr. Tarbox survived his partner, Mr. McCall by seven years. Frank T. Tarbox will succeed to his father's position in the firm. At his father's death, E. W. McCall succeeded his father. The sons of these two eminent stone producers will carry on the name of Tarbox-McCall Stone Co. E. W. McCall is president of the Ohio Crushed Stone Association.

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JOHN G. HEHMEYER, general foreman of the packing plant, Universal Atlas Cement Co., Hannibal, Mo., died on September 2. Mr. Hehmeyer had been employed by the company for 28 years.

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STANLEY A. SEMMEL, foreman in the shipping department of the National Portland Cement Co., at Brodhead, Penn., died recently from blood poisoning incurred from a bump he received in entering his automobile.

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G. M. HUGHES, who has been connected for some time in an official capacity with the Big Rock Stone & Material Co., North Little Rock, Ark., died on August 14.

Barges Ordered by Cement Company

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has placed an order for three semi-welded hopper type barges with the Dravo Corp., Pittsburgh, Penn. The barges will be used for hauling bulk cargo, principally coal, over a 95-mile stretch on the Illinois river to the cement company's La Salle plant. About 200,000 tons of coal will be hauled by barge.

The barges will have hull dimensions 11- x 35- x 195 ft., and will be of conventional river design, hopper type, except for the distinction of a raised coaming at the main deck level. Framing will be riveted, but all deck, side, and bottom plating is to be welded with the exception of side and hopper plating.

Awards for Best Papers On Arc Welding

THE JAMES T. LINCOLN ARC WELDING Foundation has announced the following awards for papers on arc welding. Awards were made to 383 individuals, who received checks ranging from $101.75 to $13,941.33 for the grand award. In the rock products division, E. H. Fleischman, draftsman, Keystone Portland Cement Co., Bath, Penn., received the award for his paper, "Improved Crushing Machine for Rock Products Industry". The Grand Award went to Mr. and Mrs. A. E. Gibson, president and stockholder of the Wellman Engineering Co., Cleveland, Ohio, who jointly received the prize.

National Gypsum Buys Oakfield Property

NATIONAL GYPSUM CO., Buffalo, N. Y., has purchased the Oakfield Gypsum Products Corp., Oakfield, N. Y., and will move machinery and three steel factory buildings to the new Savannah, Ga., plant now under construction. The steel buildings will be taken apart and shipped to the new plant in the South. Capacity of the Oakfield plant was about 300 tons of calcined gypsum daily.

The new Savannah, Ga., plant is a million dollar project which is now being constructed by the George A. Fuller Co., New York, N. Y. Warehouses and other portions of the plant will be completed by December.

Buy New Land Tract to Expand Operations

LOFTS & SON, INC., Hood River, Ore., will expand its sand, gravel and crushed stone facilities at the eastern edge of the city through the purchase of two tracts of land, one owned by the Oregon Lumber Co., and the other owned by Geo. Morrison. The company is planning to build a large modern screening and crushing plant near deep water so that barges may be used in handling various products. Lofts & Son, Inc., was organized by A. C. Loft, Sr., and is one of the oldest businesses in Hood River, Ore.

MATERIAL SERVICE CORP., Chicago, Ill., is reported to have opened up a new quarry south of Radom, Ill. Hugh Tift, Ashley, Ill., is preparing the plant for operation and will act as superintendent. The company has a contract to furnish crushed rock for a large road construction project in Jefferson County, and 20 men will be employed at the quarry. In addition to commercial crushed rock, the company will also produce agricultural limestone.

UNITED STATES GYPSUM CO., Chicago, Ill., has received an order through J. P. Duffy Co., New York, N. Y., for approximately 3,500,000 sq. ft. of mineral wool insulation to be used in the Metropolitan Life Insurance Company's new apartment project in the Bronx. It represents more than 1000 tons of material and 5000 man hours of work, and is said to be the largest order ever placed for this insulation.

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Celotex Corp..one share common for each share common held...		Nov. 4
Celotex Corp., pfd.....	$1.25	Nov. 1
Diamond Portland Cem....	.20	Oct. 20
Ideal Cement Co.....	.35	Sept. 30
Johns-Manville Corp., pfd...	1.75	Oct. 1
Kelley Island Lime & Tran.	.25	Sept. 30
Lehigh Portland Cem., pfd...	1.00	Oct. 1
Lehigh Portland Cem.....	.25	Nov. 1
Lehigh Portland Cem.....	1.00	Jan. 2
National Gypsum, 1st pfd..	1.75	Oct. 1
National Gypsum, 2nd pfd.	1.75	Oct. 1
Pennsylvania Glass Sand, pfd.	1.75	Oct. 1
Superior Portland Cem., class A	.82½	Oct. 10
Yosemite Portland Cem., pfd.	.10	Oct. 1

ARUNDEL CORP., Baltimore, Md., reports for eight months ended August 31, 1938, a profit of $899,909 after depreciation, depletion, and interest, but before federal income taxes. This compares with a profit of $850,336 in the first eight months of 1937. Capital stock consists of 483,851 no par shares. Current assets as of August 31, 1938, amounted to $3,371,318 and current liabilities were $590,502, compared with $3,527,846 and $926,794, respectively, on August 31, 1937. President Joseph V. Hogan announced that the company was low bidder since August 1, on approximately $2,800,000 of new contracts, giving the company a backlog of contract work on hand of approximately $9,000,000.

YOSEMITE PORTLAND CEMENT CORP., Merced, Calif., has extended through December 31, 1938, the period in which outstanding class A common shares may be converted into preferred on a share-for-share basis plus one-quarter of one preferred share for each $10 of dividends in arrears. About 98 percent of the total class A shares originally outstanding have been converted, it was reported, since adoption of the 1936 reorganization plan.

KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, has paid two dividends of 25c this year, and from late official reports business has been holding fairly well. The company is reported to have landed some good orders for commercial stone and sand this year.

NATIONAL GYPSUM CO., Buffalo, N. Y., has called for redemption on October 1, the issue of six percent bonds due April 1, 1943. President Melvin H. Baker reported July business the best for any month this year. "Normally, July volume is 10 percent under May, but this year the usual experience was reversed," he said. "Bookings thus far in August (August 24) make it appear that this month will be better than July. Building seems definitely on the upgrade." Engineering details for the company's new $1,000,000 plant at Savannah, Ga., are being completed, and construction will get under way before long. The company has acquired Oakfield Gypsum Products Corp., Syracuse, N. Y., for 27,000 shares of common stock and $70,000 in cash, and will remove the machinery to Savannah, Ga., where the new plant is under construction.

STANDARD SILICA CO., Chicago, Ill., reports net income of $2,546 for the first six months of 1938, equal to two cents a share on 128,952 shares of $1 par value common stock, compared with $61,256, or 47c a share on the same basis of capitalization, for the first half of 1937. Balance sheet as of June 30 shows current assets of $76,198, and current liabilities of $16,592, indicating working capital of $59,606. This compares with current assets of $89,711, current liabilities of $22,852, and $66,859 working capital at the close of 1937. President Allport, referring to current business conditions, said, "The volume of business of our customers has been seriously influenced by the uncertain conditions of business prevailing, and their purchases of silica and of silica products in turn have been greatly restricted. We have directed particular effort towards the development of our ground silica or silica flour business, and have added a number of satisfactory new accounts. The volume of sales of our silica flour has therefore suffered considerably less than has the volume of silica sand. There are indications at the present time of an improvement in the prospects for both types of products."

The company recently notified stockholders that common stock scrip certificates issued in part payment of dividends last year expired on September 15, 1938. Last year the old $10 par value common stock was split three for one, resulting in the issuance of 118,167 shares of new $1 par value common stock. Dividends of 80c a share were paid on the old stock in 1937, and 52c, optional in cash or stock, on the new common.

CATSMAN SAND AND GRAVEL CO., Flint, Mich., has decreased its capital stock from $50,000 to $5,000 common.

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio has authorized payment of $220,000 on the company's 3 to 5½ percent, ten-year first and collateral trust bonds. After this payment on October 1, there will remain outstanding $1,529,000 in bonds.

Cement Imports—Exports

METALS AND MINERALS DIVISION, Bureau of Foreign and Domestic Commerce, has announced that for July exports of cement from the United States totaled 48,327 bbl. valued at $115,761, compared with the June figure of 57,078 bbl., valued at $83,999, and the July, 1937, figure of 41,571 bbl., valued at $108,695. Exports in July included 40,460 bbl. of white, non-staining portland cement.

Imports in July totaled 69,154,617 lb. valued at $157,542, compared with June imports of 72,395,140 lb., valued at $155,239, and July, 1937, shipments of 76,809,765 lb., valued at $157,592.

Canada Cement Shipments

CANADA CEMENT CO., LTD., Montreal, Que., reports that contract business for the third quarter of the current fiscal year, which ends November 30, is somewhat less than for the same period a year ago. The first half shipments held up well, but the downward trend became evident in May when total Canadian shipments declined by approximately 12,000 bbl.

DEPARTMENT OF LABOR reports show that permits for home building in July in the urban areas of the United States aggregated $125,656,532, an increase of 128.8 percent from July, 1937. July permits were 79.1 percent above those of June, which in turn were 12 percent over May.

REPORTS OF THE F. W. DODGE CORP., covering the 37 states east of the Rockies show that contracts for new housing placed in those states in July to the amount of $87,978,000 were not only the largest so far this year, but made July the first month of 1938 in which these contracts exceeded those of the like month of 1937. The gain was 8.5 percent.

PWA HAS AWARDED up to August 15, approximately $70,466,250 for federal projects. Contracts to be awarded on additional projects were valued at $82,327,750. Plans and specifications have been completed, bids advertised, contracts awarded and work started on more than 80 percent of all the federal projects approved thus far.

American Road Builders Exhibit in San Francisco

THE 1939 AMERICAN ROAD BUILDERS' Association convention and highway exhibit will be held in San Francisco, Calif., during the early part of March, 1939, according to C. D. Macpherson, member of the board of directors and executive committee of the manufacturers' division of the A.R.B.A. Mr. Macpherson of Gar Wood Industries, Inc., Detroit, Mich., stated that the exhibition will be staged in the Civic Auditorium.

New Cement Plant for Uruguay

BIDS have been requested by the Administracion Nacional de Combustibles, Alcohol and Portland, Montevidio, Uruguay, for the design and equipment for a portland cement plant and quarry. Tenders must be received before November 8th.

Supreme Court To Pass On Florida Cement Tax

FLORIDA'S three dollars a ton tax on imported foreign cement, recently held unconstitutional by three federal judges at New Orleans, will be tested in the United States Supreme Court, an appeal having been entered by the State. The tax was levied by Florida's legislature in 1937. After the bill was passed the house of representatives recalled it from the Governor's office and sought to prevent its enforcement by letting it die at adjournment. The State Road Department decided it was not a law and refused to collect the tax. Florida's supreme court then ruled it was validly adopted and ordered the department to proceed with enforcement. Opponents of the act went into federal court and enforcement was restrained.

To Mine Abrasive Sands

THE GARNET PRODUCTS CO., was incorporated at Boise, Idaho, recently by a group of Spokane, Wash., men headed by Clyde Stewart to mine garnet abrasive sands in Benewah and Latah counties, Idaho. Headquarters will be at Fernwood, Idaho, where the first development was discovered. The new company hopes to secure an order for sand from the builders of the Grand Coulee dam for use on the penstocks and other steel surfaces that require exterior hardening and protection.

Moving Quarry

THE GENERAL CRUSHED STONE CO., Easton, Penn., is planning to move its North Leroy, N. Y., plant from its present quarries to the west, adjacent to the present location where the company owns several hundred acres of land. The change involves the moving of a considerable part of the machinery and the laying of about 1½ miles of new track. It is expected that the production of stone in the new quarry will be a little less than the 350 tons per hour rate at the old location.

New 2-cu. yd. Rex truck mixer on G.M.C. truck placed in operation recently by Builders & Industrial Supplies, Inc., Toledo, Ohio. The company now operates four transit mixers. Three are 2½-cu. yd. capacity when used as agitators or 1½-cu. yd. when used as mixers; the new unit being rated at 3-cu. yd. as an agitator

Portland Cement Statistics

In August, 1938 the portland cement industry produced 11,007,000 bbl., shipped 11,823,000 bbl. from the mills, and had in stock at the end of the month 22,470,000 bbls., according to the Bureau of Mines. Production and shipments of portland cement in August, 1938, showed decreases of 7.5 and 3.8 percent, respectively, as compared with August, 1937. Portland cement stocks at mills were 2.0 percent lower than a year ago.

Statistics here given are compiled from reports for August received by the Bureau of Mines, from all manufacturing plants.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 160 plants at the close of August, 1937 and 161 plants at the close of August, 1938.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	August		July	June	May
	1937	1938	1938	1938	1938
The month	54.4	50.4	50.2	49.8	47.4
The 12 Months ended	47.6	40.4	40.8	41.0	41.3

Concrete Pavement Yardage

Awards of concrete pavement for August, 1938, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during August, 1938	Total sq. yds. for year to date September 3, 1938
Roads	4,548,241	26,050,455
Streets	2,528,367	10,052,252
Alleys	170,279	525,903
Total	7,246,887	36,628,610

Lime Firms Cited by F. T. C.

Alleging that 20 producers of agricultural and chemical lime in the southeastern states were attempting to fix the price of their products, the Federal Trade Commission on September 20 cited these companies to answer the charges. The price-fixing activities were alleged to have been carried out by a paid representative, Hal S. Covert, of Knoxville, Tenn. Companies named in the complaint were: Pine Hill Lime and Stone Co., Pine Hill, Ky.; Southern States Lime Corp., Crab Orchard, Tenn.; Gager Lime Manufacturing Co., Sherwood, Tenn.; Knoxville Lime Manufacturing Co., Knoxville, Tenn.; Longview-Saginaw Lime Works, Inc., Longview and Saginaw, Ala.; Cheney Lime and Cement Co., Landmark and Greystone, Ala.; Ladd Lime and Stone Co., Cartersville, Ga.; Virginia Lime Co., Inc., Eagle Rock, Va.; Kimbalton Lime Co., Inc., Shawsville, Va.; Eagle Rock Lime Co., Eagle Rock, Va.; Williams Lime Manufacturing Co., Knoxville, Tenn.; Florida Lime Co., Ocala, Fla.; Dixie Lime Products Co., Ocala, Fla.; Keystone Lime Works, Inc., Keystone, Ala.; Green Bag Cement Co. of West Virginia, Lawton, Ky., and Kenova, W. Va.; M. J. Grove Lime Co., Bonsville and Frederick, Md., and Stevensville, Va.; Ripplemead Lime Co., Inc., Ripplemead, Va.; Riverton Lime and Stone Co., Riverton, Va.; Jesse Allen Lime Co., Burns, Tenn., and George L. Scott, Sr., trading as Alabaster Lime Co., Siluria, Ala.

Sand-Lime Bricks Production and Shipment

Nine active sand-lime brick plants reporting for August and eight for July, statistics for which were published in September.

Average Price for August

	Plant Price	Delivered Price
Detroit, Mich.	....	$16.00
Grand Rapids, Mich.	$11.00	14.00
Pontiac, Mich.	12.50	14.00
Milwaukee, Wis.	10.00	12.50
Minneapolis, Minn.	9.50	....
Mishawaka, Ind.	10.50	....
Syracuse, N. Y.	14.00	20.00 L/C 16.00 C/L

Statistics for July and August

	July†	August‡
Production	1,687,112	3,119,700
Shipment (rail)	271,950	777,985
Shipment (truck)	1,559,940	3,130,453
Stock on hand	1,185,024	1,701,390
Unfilled orders	960,000	250,000

†Eight plants reporting: incomplete, three not reporting unfilled orders and two not reporting stock on hand.

‡Nine plants reporting: incomplete, eight not reporting unfilled orders and three not reporting stock on hand.

W. R. Stuard, Lawrenceburg, Ind., has organized a company that will deal in sand, gravel and crushed stone, and a plant is now under construction at Hardentown, Ind., on a 10-acre tract of land purchased from Isaac Miller. Tests indicate a gravel deposit of 60 ft. A washing and screening plant is being built, the water being furnished from an open well.

Mt. Whitney Slate Quarries, near Keeler, Calif., may be taken over by United States Gypsum Co., Chicago, Ill., according to a local report. Several colors of slate are available for the roofing market. Grinding facilities are available within a short hauling distance from the deposit and fines from the mine are said to be a superior product.

The Triangle Fertilizer Co., Salinas, Calif., has opened the old gypsum quarry in the Bitterwater section at the top of the grade above Station 5. This quarry, which is being leased from Tannehill Bros., has not been worked for many years. Haulage is by means of trucks.

Traffic and Transportation

PROPOSED RATE CHANGES

The following are the latest proposed changes in freight rates up to and including the week of September 17:

Central

53114. To establish on **loam or sand loam,** in open top cars, C. L., from Porter, Ind., to Chicago, Ill., rate of 80c per net ton., via M. C. R. R.

55353. Cancel specific commodity rates on **cobble stone; crushed stone; field stone; limestone,** other than agricultural limestone, viz.: lump, crushed or dust; quarry scrap; refuse stone (broken); rip-rap; rubble stone; spalls, from Monroe and Sibley, Mich., to destinations in Ohio.

55361. Establish on **stone,** rubble, rip rap and spalls, C. L., from Sandusky, O., to Toledo, O., 84c, and Detroit, Mich., 193c per net ton.

55403. Establish on **sand and gravel,** C. L., from Logansport, Ind., to representative Wabash Ry. Stations:

To	Prop. Rates	To	Prop. Rates
Detroit, Mich.	149	Urbana, Ill.	97
Adrian, Mich.	149	Philo, Ill.	108
Seneca, Mich.	143	Decatur, Ill.	108
Franklin, Ohio	140	Illiopolis, Ill.	124
Montpelier, Ohio	124	Springfield, Ill.	124
Arctic, Ind.	124	Taylorville, Ill.	124
Grabell, Ind.	105	Lotus, Ill.	124
Toledo, Ohio	149	Monticello, Ill.	108
Woodburn, Ind.	105	Voorhees, Ill.	124
Ft. Wayne, Ind.	99	Shumway, Ill.	124
Aboite, Ind.	94	Hamilton, Ind.	127
Roanoke, Ind.	88	Helmer, Ind.	132
Huntington, Ind.	83	Wolcottville, Ind.	138
LaGro, Ind.	77	Wakarusa, Ind.	143
Wabash, Ind.	72	Wyatt, Ind.	149
Peru, Ind.	66	Dillon, Ind.	154
Burrows, Ind.	66	Kingsbury, Ind.	154
Lafayette, Ind.	77	Crocker, Ind.	160
Attica, Ind.	84	Tolleston, Ind.	160
Danville, Ill.	84		

55427. Establish on **stone,** crushed in bulk, and **crushed stone screenings,** in bulk, in open top cars, C. L., Spore, O., to Bellevue, O., 66c per net ton, via N. Y. C. R. R. direct.

55428. Establish on **sand** (except naturally bonded moulding, ground or pulverized sand) in open top equipment, C. L., Essex, Ill., to South Bend, 147c, and Terre Haute, Ind., 149c per net ton. Route—To South Bend, Ind., via Wab. Ry., Pine, N. J. I. & I.; to Terre Haute, Ind., via Wab. Ry., Danville, Ill., C. & E. I. Ry.; via Wab. Ry., Newell, Ill., C. M. St. P. & P. R. R. and via Wab. Ry., Danville, Ill., C. C. C. & St. L. Ry.

55454. Establish **crushed stone,** C. L., Huntington, Ind., to Butler, Ind., 70c per net ton via Wab. Ry.

55468. Establish on **slag,** crushed or crushed commercial (not granulated), in open top cars, Jackson, O., to Richmond, Ind., 149c per net ton.

55488. Establish on **sand** (other than ground or pulverized or naturally bonded moulding) and **gravel,** in open top cars, without tarpaulin or other protective covering, C. L., New Martinsville, W. Va., to West Alexander, Vienna and Claysville, Penn., 88c per net ton via B. & O. R. R. direct.

Sup. 1 to W. D. A. 55201. Amendment Notice, White Docket Advice 55201, Docket Bulletin 2930, dated July 18, 1938, proposal establish rates **lime,** common, hydrated, quick or slacked, C. L., Detroit, Mich., to Troy, O., by providing for addition of following therein: Proposed rates—From Detroit, Mich., to Findlay, O., 13, min. wt. 30,000 lb.; min. wt. 50,000 lb, 10½. Routes —Via P. M., Toledo, B. & O.; via P. M., Toledo, N. Y. C.; via P. M., Toledo, N. Y. C. & St. L.

Sup. 1 to W. D. 55281. Withdrawal notice. White Docket Advice 55281, Docket Bulletin 2932, dated July 27, 1938, proposal cancel present proportional rates on **crushed granite; stone,** crushed or broken; **stone,** rip rap and **stone,** screenings, C. L., Milwaukee, Wis., across lake (via car ferry) to destinations in Mich. and Toledo, O., is hereby withdrawn from the docket.

55527. Establish on **stone,** crushed, broken or rip rap; screenings and granite, crushed, in straight or mixed carloads, from Kewaunee, Manitowoc and Milwaukee, Wis., to Bowling Green and Findlay, O., 220c per net ton. (Proportional rates, applicable only on shipments originating west of Kewaunee, Manitowoc or Milwaukee, Wis.) Route —To Bowling Green, O.—via P. M.—Toledo, O.—B. & O. or N. Y. C. to Findlay, O.—via P. M.—Toledo, O.—B. & O., N. Y. C. or N. K. P.

55558. Establish on **sand** (except naturally bonded molding; ground or pulverized sand), in open top equipment, C. L., from Essex, Ill., to Michigan City, Ind., 110c per net ton., via Wab. Ry., Westville, Ind., C. I. & L. Ry.; via Wab. Ry., Tolleston (Gary), Ind., C. S. S. & S. B. R. R.; via Wab. Ry., Chicago or Steel, Ill., M. C. R. R., and via Wab. Ry., Chicago, Ill., P. M. Ry.

55565. Cancel commodity rate of 215c per net ton on **sand and gravel,** C. L., New Martinsville W, Va., to Mabie, W. Va., named in Item 11065-B, Sup. 60, C. F. A. L. Tariff 218-K, and similar rate in individual lines' tariffs, classification basis to apply.

55581. Establish on **crushed stone** and **crushed stone screenings,** C. L., in open top cars, North Vernon, Ind., to Cincinnati, O., 105c per net ton, via C. C. C. & St. L. Ry. direct.

55582. Establish on **stone,** crushed or **gravel,** coated with oil, tar or asphalt (see note), in open top cars, C. L., Joliet, Ill., to Marine City, Mich., 320c per net ton.

Note—The oil, tar or asphaltum not to exceed 10% of the weight of the commodity shipped, the shipper to so certify on shipping order and bill of lading.

55579. Establish on **rip rap and breakwater stone,** C. L., Bedford-Bloomington, Ind., district, to Ironton, O., 200c per net ton, via C. I. & L. Ry., Greencastle or Crawfordsville, Ind., C. C. C. & St. L. Ry., Springfield, O., D. T. & I. Ry.

55584. Establish on **ground limestone,** C. L., Greencastle, Ind., to Chicago, Ill., 165c per net ton.

55614. Revise rate on **gravel** or **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), in open top cars, Erie, Penn., to West Springfield, Penn., to 45c per net ton via B. & L. E. R. R. direct.

55669. Establish on **limestone,** ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., from Northwestern Ohio Group 1 origins; also Marble Cliff and West Columbus, O., to C. & O. Ry. destinations in West Virginia in C. F. A. territory, rates as described below:

(Rates in cents per net ton)

* To (representative pts.) C. & O. Stations	* Prop. Rates	† Prop. Rates
Elkridge, W. Va.,		
No. 3 and 4	259	215
Nuckolls, W. Va.	259	215
Kingston, W. Va.	270	226
Whitesville, W. Va.	259	226
Edwight, W. Va.	270	226
Kayford, W. Va.	259	215
Sproul, W. Va.	259	204
Brushton, W. Va.	259	215
Blue Pennant, W. Va.	259	226
Vass, W. Va.	259	215
Sharples, W. Va.	259	226
Sovereign, W. Va.	270	226
West Junction, W. Va.	259	215
Gordon, W. Va.	259	226
Scott, W. Va.	237	193
Logan, W. Va.	259	215
Mud Fork Jct., W. Va.	259	215
Argonne, W. Va.	259	215
Three Forks, W. Va.	270	226
Ethel, W. Va.	259	215
Davin, W. Va.	259	226
Emmett, W. Va.	270	226

*From Northwestern Ohio Group 1.
†From Marble Cliff and West Columbus, O.

55670. Establish on **limestone,** ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., from Northwestern Ohio Group 1 origins to Chicago, Ill., 226c per net ton.

55672. Establish on **slag,** crushed, in bulk, in open-top cars, C. L., from Sharpsville, Penn., to Carlson, 165c; Chaffee, 165c; Lucinda, 143c; Marionville, 154c; Nanson and Russell City, Penn., 165c per net ton.

55696. Establish on **sand,** all kinds, and **gravel,** C. L., Columbus, Ohio, to Newark, Ohio, 50c per net ton, via B. & O. R. R. direct.

55699. Establish on **crushed stone, chatt, slag, sand** or **gravel,** coated with oil, tar, asphalt or asphaltum, in open top cars (see note), C. L., Ottawa, Ill., to Port Huron, 320c, and Owosso, Mich., 295c per net ton. Note—The oil, tar, asphalt or asphaltum not to exceed 10 percent of the wt. of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading.

55700. Establish on (a) **sand,** naturally bonded moulding, in all kinds of equipment, C. L.; **sand** (except naturally bonded moulding; ground or pulverized sand), in closed equipment, C. L.; (b) **sand,** ground or pulverized, in all kinds of equipment, C. L.; (c) **sand** (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L.; Ottawa, Ill., district to Warsaw Junction, Ohio; (a) 297c, (b) 327c, (c) 297c per net ton, via C. B. & Q. R. R. or C. R. I. & P. Ry., Chicago, Ill., thence P. R. R.

55709. Establish on (a) **sand,** naturally bonded moulding, in all kinds of equipment, C. L.; **sand** (except naturally bonded moulding; ground or pulverized sand), in closed equipment, C. L.; (b) **sand,** ground or pulverized, in all kinds of equipment, C. L.; (c) **sand** (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L.; Ottawa, Ill., district to Penn., Ind.; (a) 187c; (b) 206c; (c) 149c per net ton., via C. B. & Q. R. R. or C. R. I. & P. Ry., Chicago, Ill., N. Y. C. Sys., Mishawaka, Ind., Twin Branch R. R.

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*Note—Reason: No present or prospective movement.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Trunk

Sup. 1 to 36862. **Ganister rock,** not ground, C. L. (See Note 3), from Barre, Penn., Brooks Mills, Penn., Cumberland, Md., Floating Springs, Hannah, Harbison Walker Refractories Co. No. 16, Madley, Moores Mills, Mt. Union, Port Matilda and Wolfsburg, Penn., to Philo, O., $2.58 per net ton. Reason—Same as proposed from Berkeley Springs, W. Va.

37028. **Slag,** C. L. (See Note 3), from Riddlesburg, Penn., to Phillipsburg, Penn., $1.32 per net ton, in lieu of present sixth class rate of 16c per 100 lb. Reason—Reflects Buckland scale.

M-3873 (increase) To amend Item 8050 of Agent W. S. Curlett's Tariff I. C. C. No. A-573 applying on **sand,** common, by elimination of Great Cacapon, W. Va., Hancock, Round Top, Cumberland, Md., and Ridgeley, W. Va., as points of origin, and Canadian Territory 100-B as destination to all points, class rates to apply.*

37032. **Lime,** common, hydrated, quick or slaked, C. L., min. wt. 60,000 lb., from Ivanhoe, Va., to Keokuk, Ia. $4.60 per net ton, in lieu of present 6th class rate of 46c per 100 lb. Reasons: Reflects 80 percent of I. C. C. Docket 16170 Scale Extended, including Ex Parte 123 increase.

37033. **Sand** (other than ground or pulverized or natural bonded moulding) in open top or in closed cars, C. L., from Edwards, N. Y., to Cleveland, O., $2.97 per net ton, in lieu of present 6th class rate. Reason: Reflects Industrial Sand Scale for distance.

37050 (increase). To cancel commodity rate of $1.16 per gross ton on **crude dolomite,** C. L., from Alexandria, Frankstown, Horrell, Oreminea and Williamsburg, Penn., to Neville Island, Penn., published in Agent Curlett's I. C. C. A573, Item 2300.*

37057 (increase). To cancel commodity rate of $2.15 per net ton on **sand and gravel,** C. L., from New Martinsville, W. Va., to Mable, W. Va., published in Agent Jones' Tariff I. C. C. 3028, Item 11065-B of Supplement 60.*

37060. **Sand,** common or building (not blast, engine, fire, foundry, glass, moulding or silica sand), and **gravel,** C. L. (See Note 3), from Boonville and Alder Creek, N. Y., to various New York state points, rates ranging from $1.76 to $1.98 per net ton, in lieu of present rates ranging from $1.87 to $2.31. Reason: Based on joint Lycoming scale extended and increased.

37063. **Limestone,** unburnt, ground or pulverized, C. L., or **stone dust,** C. L., min. wt. 60,000 lb., from Easton, Easton (Bushkill station) and Easton (13th St.), Penn., to Mount Clemens, Mich., $4.35 and to Sheboygan, Wis., $5.34 per net ton, in lieu of present 6th class rates $7.80 and $9.60, respectively. Reason: Account of comparable rates from other origins.

Sup. 1 to 36989. **Limestone,** ground, C. L., min. wt. 60,000 lb., from York, Thomasville and Bittinger, Penn., to Toronto, Brantford, Ont., 28c, Cornwall, Ont., 31c, Granby and Montreal, Que., 36c and Sherbrooke, Que., 38c per 100 lb., in lieu of present 6th class rates.

37070. **Sand,** common or building (not blast, engine, fire, foundry, glass, molding or silica), C. L. (See Note 3), from Forestport, N. Y., to various pts. on L. V. R. R. in New York state rates ranging from $1.32 to $1.97 per net ton, in lieu of present rates per Exhibit, copy of which will be furnished upon request. Reason—Based on joint Lycoming scale.

37074. **Stone chips** or **granules** (roofing granules), C. L., min. wt. 50,000 lb., from Advance and Gladhill, Penn., to Portneuf, Que., 34c per 100 lb., in lieu of present 6th class rate 49c. Reason—Account of comparable rates to other destinations.

37075. **Limestone,** broken, crushed, ground or pulverized, min. wt. 60,000 lb., from Wingdale, N. Y., to Chambersburg, Penn., $3.36 and Pittsburgh, Penn., $3.47 per net ton, in lieu of present 6th class rates. Reason: Based on I. C. C. Docket 25220 scale.

37080. **Crushed stone and screenings** (in straight or mixed C. L.) (will not include agricultural limestone or ground limestone, unburnt; fluxing stone or firestone; or stone coated with oil, tar or asphaltum), C. L., from Monocacy, Penn., to East Ithaca, N. Y., $2.20 per net ton, in lieu of present rate $3.36. Reason: Based on extended Lycoming scale.

M-3874 (increase). To amend Item 8085 of Agent W. S. Curlett's Tariff I. C. C. No. A-573, applying on **sand,** viz.: Glass, quartz, silica and silex, by elimination of Cumberland, Md., Great Cacapon, W. Va., Hancock, Md., Ridgeley, W. Va., and Round Top, Md., as points of origin, and Canadian Territory 100-B as destination territory, class rates to apply.*

M-3875 (increase). To cancel from Agent W. S. Curlett's Tariff I. C. C. No. A-573, Item 8086. **Sand,** viz.: Glass, core moulding, quartz, silex and silica, from Sylvan Beach and Sylvan Jct., N. Y., to Guelph, Ont., class rates to apply.*

M-3876 (increase). To cancel from Agent W. S. Curlett's Tariff I. C. C. No. A-573, Item 8090. **Sand,** viz.: Common, from Albany, Baltimore, Cumberland, New York bases, etc., to Canadian Territory 76-C, 76-D, 78-C, 78-D and 100-B, class rates to apply.*

M-3877 (increase). To cancel from Agent W. S. Curlett's Tariff I. C. C. No. A-573, Item 8095. **Sand,** viz.: Glass, quartz, silica and silex, from Albany, Baltimore, Cumberland, New York bases, etc., to Canadian territory 76-D, 78-D and 100-B, class rates to apply.*

M-3878 (increase). To cancel from Agent W. S. Curlett's Tariff I. C. C. No. A-573, Item 8115. **Sand,** moulding, from Berkeley Springs, W. Va., Granville, Penn., Hancock, Md., Round Lake, N. Y., etc., to Canadian territory 76-C, 76-D, 78-D and 100-B, class rates to apply.*

M-3879 (increase). To cancel from Agent W. S. Curlett's Tariff I. C. C. No. A-573, Item 8231. **Sand,** moulding, from Albany, Baltimore, Cumberland, New Berlin, New York bases, etc., to Canadian territory 76-C, 76-D, 78-C, 78-D and 100-B, class rates to apply.*

M-3880 (increase). To cancel from Agent W. S. Curlett's Tariff I. C. C. No. A-573, Item 8232. **Sand,** potters, from Ernston, N. J., to Belleville, Ont., class rates to apply.*

Southern

17373. Establish for interstate and intrastate application between points in S. F. A. territory rates on **sand, gravel, crushed stone, slag, etc.,** as described in Item 250D of S. F. T. B. Tariff 388A, I. C. C. 1635, made 5c net ton higher than the Docket 17517 scales (without including Ex Parte 115 and Ex Parte 123 increases).

17383. **Barytes,** C. L. Establish to Salem, N. J., from Jamestown, Tenn., 660c; Kings Creek, S. C., 583c; Afton, Athens, Calhoun, Chuckey, Greeneville, Jonesboro, Limestone, Niota, Reagan, Sweetwater and Washington College, Tenn., 605c gross ton.

17393. **Concrete pipe,** sewer or culvert, C. L., min. 80,000 lb. Establish 10c cwt., Valdosta to Savannah, Ga. (intrastate). Truck competitive.

17540. **Limestone** or **marble,** ground or pulverized, C. L., min. wt. 88,000 lb. Establish 277c net ton from Sparta, Tenn., to St. Louis, Mo., and East St. Louis, Ill., when for L. & N. delivery; also apply 277c rate to East St. Louis for beyond.

17485. Reduce the C. L. min. wt. on mixed C. L. shipments of **plaster and gypsum blocks or tile** on Fla. intrastate traffic from 60,000 lb. to 50,000 lb. Truck competitive.

17490. **Superphosphate,** crude, C. L., min. 70,000 lb. Establish 353c net ton, Mt. Pleasant, Tenn., to East St. Louis, Ill. To alternate with present rate of 450c net ton min. 40,000 lb.

17514. Revise present rates on **lime,** C. L., intraterritorially between points in the south as follows: 50,000 lb. min. $1 over present rates observing cement rates as maxima; 30,000 lb. min. to be made 125 per cent of rates subject to minimum of 50,000 lb.

17573. **Stone,** broken, C. L. Establish from Sylva, N. C., to Chester, Penn., 484c; Hays, Penn., 506c net ton; Buffalo, N. Y., 29c; Canton and Massillon, Ohio, 24c; Cleveland, Warren and Youngstown, Ohio, 25c cwt.

17591. **Limestone,** C. L. Cancel, as obsolete, rate of 178c net ton from Calera, Ala., to Mobile, Ala., for export. Class or combination rates to apply.

Western

E-41-256. **Stone,** crushed, C. L., usual min. wts. to apply, from Sioux Falls, Dell Rapids, S. D., Pipestone, Minn., and stations grouped therewith, to stations in Iowa. Rates: Present—As published in individual lines' tariffs. Proposed—to representative points (in cents per 100 lb.): Sibley, 6; Storm Lake, 8½; Mason City, 8½; Ft. Dodge, 9.

Illinois

8414-2. **Sand** (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L., from Essex, Ill., to Moline, East Moline, Rock Island, Ill., and Davenport, Ia. Present—Classification. Proposed—$1.43 net ton.

8600. **Gravel** or **sand** (common river) straight or mixed C. L. (See Note 2), except when car is loaded to full cubical or visible capacity actual wt. will apply (will only apply on traffic moving in open top cars). **Stone,** crushed, C. L. (See Note 2), except that when cars are loaded to full visible capacity actual wt. will apply, but not less than 40,000 lb. from E. St. Louis, Ill. (sand), Falling Springs, Ill. (stone), to Scott Field, Ill., and Grassland, Ill. Rates in cents per ton of 2000 lb. Sand—Present, 88; proposed, *55. Stone—Present, 88; proposed, 73. *Applies only from tracks of Southern Ry. No switching to be absorbed. Switching amounting to 15c per ton will be in addition to rate.

Southwestern

14460. **Limestone,** Valmeyer, Ill., to the southwest. To establish rates on crushed or ground limestone, carloads (See Note 2), but not less than 80,000 lb., from Valmeyer to points in Ark., La. (west of the Mississippi River), Kan., Mo., Okla. and Tex., based on the scales as prescribed in I. C. C. Docket 17000. Part 11-A, plus increase under Ex Parte 123.

14465. **Silica and tripoli,** Racine and Seneca, Mo., to Rock Springs, Wyo., and Utah common points. To establish rate of 66c per 100 lb. on silica, crushed or ground, C. L., and tripoli, crushed, ground or pulverized, C. L., from Racine and Seneca, Mo., to Rock Springs, Wyo., and Utah common points.

New England

44771 (1-R). **Common sand and gravel,** min. wt. 50 net tons except where cars of lower capacity are furnished for carriers' convenience, the C. L. min. wt. will be the marked capacity of the car, Westboro, N. H., to Beecher Falls, Vt., and West Stewartstown, N. H. Present, $1.76 net ton; proposed, $1 net ton. Reason: To enable rail carriers to receive a haul on this material.

45130. To cancel B. & M. P. S. C.-N. Y. 1005, naming rates on **common** or **building sand** (except industrial), and run-of-bank, screened or crushed **gravel,** from Scotia, N. Y., to stations on the N. Y. C. R. R. and W. S. R. R., and permit class rates to apply. Reason—Obsolete.

THE INDUSTRY

New Incorporations

Nashua Valley Crushed Stone Co., Inc., Fitchburg, Mass., has been incorporated with Everett H. Dudley, president; Frances M. Donahue, treasurer; and Dorothy P. Nelson, clerk. Capital stock consists of 100 common shares of no par value.

Crapo Gravel Co., Swartz Creek, Mich., has been incorporated by Stanford Crapo, James Steel, Jr., and Victor Mikan, with a capital stock of $9,000.

Agri-Lime Corp., Waynesboro, Va., with a maximum capital of $25,000 has been granted a charter. It will manufacture limestone products, as well as other minerals, stone, etc., and lease properties in Augusta county for the purpose. Robert L. James is president; C. C. James, vice-president; and L. W. Jennings, secretary-treasurer.

Natural Sand & Gravel Co., Inc., Millville, N. J., is the name of a new company with a capital stock of $50,000. Paul H. Cranmer is service agent.

R. E. James Gravel Co., Inc., Texas, has been incorporated in Oklahoma with a capital stock of $10,000. Geo. M. Green, 735 1st National Bldg., Oklahoma City, Okla., is service agent.

Pearce Limestone Corp. of Gifford, Iowa, has been incorporated for $10,000.

William F. Koenig Co., Ferguson Road and the C. & O. Railroad, Cincinnati, Ohio, has made application for a charter to change from personal to corporate ownership with a capital stock of 250 shares of no par value. The company deals in concrete products. Incorporators are William F. Koenig, B. Harvey Dale and Mary Catherine Koenig.

Ideal Sand and Gravel Co., Mason City, Iowa, is the name of a new incorporation to develop sand, stone, rock, gravel or silex deposits, and any other by-products incidental thereto. The total authorized capital is 1,000 shares, without nominal or par value. Directors are U. G. McGowan, Wayne A. McGowan and Maud B. McGowan.

Maysville Lime and Stone Co., Inc., Maysville, Ky., is the name of a company which has been recently organized to supply ground limestone to farmers and commercial stone. T. A. Duke is president; Andrew C. Duke, vice-president; Ellsworth Brodt, secretary and treasurer, and Frank Atherton, general manager.

Carter Rock and Sand Corp., Miami, Fla., has been granted a charter with a capital of 50 shares, $100 par value. Directors are C. R. Carter, C. L. Carter, and J. J. Brown.

Carolina Phosphate Products Corp., Charleston, S. C., has been incorporated to mine, manufacture and deal in phosphates, commercial fertilizer and by-products with a capital stock of $10,000. Officers are E. H. Hutchinson, president, and Lionel K. Legger, secretary and treasurer.

Cement Products & Supply Co., Lakeland, Fla., has been incorporated with a capital of 100 shares, $100 par value. H. B. Zimmerman, C. W. Zimmerman and F. M. Zimmerman are directors.

Coosa Sand and Gravel Co., Gadsden, Ala., has been incorporated by Sam B. Pearce, Corinne Pearce and Jas. Sivley with an authorized stock of $10,000, paid in, $5,000.

Delaware Concrete Products Co., Glasgow, Del., has been granted a charter with a capital stock of $25,000. Incorporators are D. V. Culver, M. E. Verner, E. T. Rettew, Wilmington.

Valley Ready Mixed Concrete Co., Appleton, Wis., has recently been incorporated by W. K. Miller, D. E. Coffey, Frank Murphy, and Jas. R. Joyce with a capital stock of 500 shares at $100 each.

Manufacturers

Air-Maze Corp., Cleveland, Ohio, has announced establishment of a new factory and office building at 5200 Harvard Ave., Cleveland.

Lincoln Electric Co., Cleveland, Ohio, has announced the retirement of J. W. Meriam, who has been vice-president and secretary of the company since 1914. Mr. Meriam's retirement, at the age of 60, closes a business career which spans the growth and development of the arc welding industry. Although retiring from active service, Mr. Meriam will remain a director. A. F. Davis, vice-president, was elected secretary and the company's credits and collections will be handled by Frank K. Griesinger.

Gar Wood Industries, Inc., Detroit, Mich., Hoist and Body Division, announces the appointment of Ralph J. Reich as manager of the Buffalo branch. Mr. Reich has been connected with the Buffalo branch for a number of years as assistant manager. He also has supervision of the Syracuse, Rochester and Buffalo territories.

W. R. Stephens Co., Minneapolis, Minn., has been appointed distributor of General Motors Diesel engines in the Middle Northwest. A separate unit of the Stephens company, which has been a Buick distributor in its territory for many years, has been created. The unit, to be known as the diesel division of W. R. Stephens Co., is headed by T. J. Mains, whose appointment as manager has just been announced by Mr. Stephens, the president of the company. The company also has been appointed dealers of the Gray Marine Motor Co. of Detroit, which converts the small series of GM Diesels for marine applications. It already has a General Motors Truck franchise. As a result of the series of appointments, distribution of the GM Diesel engines for all purposes other than railroad motive power and heavy marine duty will be through this single outlet in the Middle Northwest, throughout which the Stephens Co. will appoint dealers.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn., through President George H. Bucher, has announced the appointment of Frank D. Newbury as manager of the New Products Division of the company to succeed Herbert Mygatt Wilcox, who died July 28. In addition to the development of activities for Westinghouse in new fields, Mr. Newbury will continue his present duties as economist for the company. He has been with the company for 30 years, holding a number of positions ranging from apprentice to general manager for machinery engineering.

Allis-Chalmers Manufacturing Co. has moved its Dallas, Tex., district office, of which E. W. Burbank is manager, to a new location, 1800 N. Market Street, where the power, electrical and industrial divisions of the company now occupy an entire building. The company's tractor and farm implement division still maintains its own sales and service branch in that city.

Farrel-Birmingham Co., Ansonia, Conn., has recently begun construction of additional foundry building space at its Ansonia plant. The new building, which will be completed by December, will add 4,000 sq. ft. of floor area as part of a program of rearrangement of the Ansonia foundry department for increased efficiency and output. Included in the new equipment to be installed is a 15-ton traveling crane, a large molding machine and a modern sand handling system for eliminating dust and reclaiming sand from molds used in the Randupson process.

The Timken Roller Bearing Co., Canton, Ohio, has just opened offices at 519 Transportation Bldg., Washington, D. C., to provide facilities to the various governmental departments. A. L. Campbell will be in charge. He joined the engineering staff of the company in 1929, later followed sales engineering work both in Philadelphia and Washington, and in 1936 returned to the home office in Canton to assist in organizing and developing the sales and engineering of the fuel injection equipment division.

Buffalo Scale Co., Inc., Buffalo, N. Y., has opened an Atlanta branch at 649 Whitehall St., S. W. It will be under the management of G. E. Daub, who has been engaged in the scale business in the South for the past 20 years.

Trade Literature

The following literature, recently published, is available free, upon request to the respective sponsor:

Diesel.—Ball-Muncie Engine Co., Muncie, Ind. Bulletin VC-29 describes and illustrates its new type VC heavy duty, stationary Diesel engines and bulletin 7H-538, its new type 7H horizontal Diesel engine which has 90 h.p. and is equipped with roller bearings.

Material Handling Systems.—Gifford-Wood Co., Hudson, N. Y., has issued a new bulletin No. 138, which illustrates the essential steps in their five point plan of the selection of handling systems. This comprehensive bulletin also illustrates the application of conveying machinery to a wide field of industries.

Mechanical Rubber Goods.—The Goodyear Rubber Co., Akron, Ohio, has now made available a new illustrated catalog describing its mechanical goods products. The catalog contains valuable hints on proper care of rubber belting and maintenance of belting service records.

Pulverators.—Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has released a new bulletin 1467-A, illustrating and describing its complete improved line of multi-impact pulverators or hammer mills recommended for pulverizing coal, limestone, oyster shells and other nonabrasive materials. In addition to details of design construction, the bulletin includes size and capacity tables, as well as dimension sheets.

Dust Collection.—Clark Dust Control Company, Inc., 210 N. Mozart St., Chicago, Ill. A bulletin has been issued describing the various Clark all-metal dust collecting and dust separating systems. The dust control devices are illustrated and explained in the text, which also describes some applications of the systems.

Centrifugal Pumps.—Allis-Chalmers Manufacturing Co., Centrifugal Pump Division, Milwaukee, Wis., has come out with a new bulletin, No. 1653, on their line of close-coupled centrifugal pumps. It includes capacity tables showing ratings obtainable, recommended motor sizes and speeds for various ratings as well as dimension sheets and useful data for figuring pump installations.

Railway Cars.—The Koppel Division of Pressed Steel Car Co., Inc., Pittsburgh, Penn., has issued a new informative 16-page bulletin describing their line of industrial railway cars and accessory equipment.

Slurry and Sludge Pumps.—Morris Machine Works, Baldwinsville, N. Y. The Morris centrifugal pumps for handling slurry, sludges and similar abrasive mixtures are described in a new bulletin, No. 173.

Tractor Performance.—R. G. LeTourneau, Inc., Peoria, Ill. In an interesting booklet, "Rock Bottom Costs for Stripping, Quarrying and Aggregates" examples of tractor tool flexibility to meet numerous mining operations are pointed out with actual job stories in picture-caption style.

Rock Drills.—The Texas Co., New York, N. Y., is offering a 36-page booklet on "Rock Drills and How to Keep Them Functioning Properly", which should be of interest to all users of such equipment. Such subjects as where to look for trouble in drilling equipment, the preclusion and remedy of such trouble, and hints for more efficient operation are covered.

Material Handling Equipment. — The Columbus Conveyor Co., Columbus, Ohio, has brought out a catalog No. 55 showing its complete line of conveying, elevating, screening, crushing and transmission machinery. The book illustrates and briefly describes a number of its conveyor installations in the various fields of industry. It gives practical applications and information on complete units and individual conveyor parts.

Vibrating Screens.—Deister Machine Co., Fort Wayne, Ind. Bulletin No. 26 describes and depicts the Deister Plat-O heavy duty vibrating screen.

Portable Bituminous Mixing Plants — Hetherington & Berner, Inc., Indianapolis, Ind. Bulletin T-260 thoroughly illustrates its new model P-A portable mixing plants. It contains illustrations of the various parts and the unique step-by-step assembly of this plant.

Rock Drill Lubrication.—E. F. Houghton & Co., 3rd, American and Somerset Sts., Philadelphia, Penn., has put out a folder describing STA-PUT rock drill lubricants and air compressor oils. The folder discusses the qualities which make these lubricants especially adaptable to rock drilling.

Air Circuit Breaker.—Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn. Type "U" De-ion air circuit breakers are thoroughly described in a 12-page illustrated booklet No. 33-675.

Inclined-Grate Cooler.—Fuller Company, Catasauqua, Penn., has issued a bulletin CO-1 describing Fuller inclined-grate cement clinker cooler. Illustrations of installations and an excellent flow sheet diagram, showing primary and secondary coolers on different levels, are included in the bulletin.

Tractors.—Caterpillar Tractor Co., Peoria, Ill. Capacities, specifications and mechanical features of Caterpillar Diesel D8 Tractor have been grouped together in a new booklet, Form 4876. It is profusely illustrated, showing action views of the tractor on the job, as well as cutaway views of the engine.


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Car Pullers & Movers
Link-Belt Co.
Robins Conveying Belt Co.

Car Wheels
Eagle Iron Wks.
Link-Belt Co.

Castings
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works (Grey Iron)
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co.
Traylor Engineering & Mfg. Co.

Cement Plants (Contractor)
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Cement Colors
Mepham, Geo. S., Corp.

Cement Process
Cement Process Corp.

"This Diesel performs better since we put GULF PARVIS OIL in service" SAYS THIS CHIEF ENGINEER.

"Bearings run cooler and oil consumption is less"

"WE proved there's really a difference in oils when we put Gulf Parvis Oil in service," says this chief engineer. "The Gulf engineer was right when he told us that Parvis would do a better job."

To get reliable service from Diesel engines, good lubricants are an absolute necessity. Diesels don't thrive on cheap oils — and any operator who uses them should not expect the best performance from his equipment.

Gulf Parvis Oil is a *quality* oil. That is why so many Diesel operators from Maine to Texas are reporting the same kind of results to which this chief engineer testifies. Less wear, fewer repairs and a "sweeter" running engine are the benefits which accompany the use of Gulf Parvis Oil.

Ask the Gulf engineer who calls at your plant to recommend from Gulf's broad list of more than 400 quality oils and greases the proper application of lubricants exactly suited to your Diesels. He has had broad experience and is qualified to assist you in securing the best possible lubrication of your Diesel equipment. Why not take advantage of this money-saving service at once?

Gulf Oil Corporation • Gulf Refining Company

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

Listen to the new Gulf radio program —THE PASSING PARADE, with John Booth Nesbit—every Sunday evening, Columbia network.

Classified Directory (Cont.)

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Jaeger Machine Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Link-Belt Co.

Chain (Elevating and Conveying)
Bacon, Earle C., Co.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.

Chimney Block Machines and Molds
Besser Mfg. Co.

Chutes (Bin, Truck, Concrete, Etc.)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earl C. Bacon, Inc.
Blaw-Knox Co.
Eagle Iron Works
Haiss, Geo., Mfg. Co.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Chute Liners
Bacon, Earle C., Inc.
Haiss, Geo., Mfg. Co.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Circuit Breakers
Allis-Chalmers Mfg. Co.

Clarifiers
Hardinge Co., Inc.
Link-Belt Co.

Classifiers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Eagle Iron Works
Hardinge Co., Inc.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
Nordberg Manufacturing Co
Pioneer Engineering Wks., Inc.
Raymond Pulverizer Division
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Universal Vibr. Screen Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Coal Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Combustion Engr. Corp.
Hardinge Co., Inc.
Link-Belt Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Jaeger Machine Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Controllers (Electric)
Allis-Chalmers Mfg. Co.
Electric Machinery Mfg. Co.

Converters (Electric)
Allis-Chalmers Mfg. Co.

Conveyors (Apron)
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Conveyors (Belt)
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Mach.y. Co.
Earle C. Bacon
Barber-Greene Co.
Besser Mfg. Co.
Fuller Company
Gay, Rubert M., Div.
Geo. Haiss Mfg. Co., Inc.
Hendrick Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
McNally-Pittsburg Mfg. Corp.
Multiplex Concrete Mach. Co.
New Holland Machine Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Stearns Mfg. Co.
Sturtevant Mill Co.
Syntron Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Hydro Vacuum)
Allen-Sherman Hoff Co.

Conveyors (Pan)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.

Conveyors (Pneumatic)
Fuller Company
Raymond Pulverizer Division
B. F. Sturtevant Co.

Conveyors (Screw)
Besser Mfg. Co.
Eagle Iron Works
Hardinge Co., Inc.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.

Conveyors (Trolley)
Link-Belt Co.

Conveyors (Vibrating)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Syntron Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Coolers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Link-Belt Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Coolers (Clinker)
Fuller Co.

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Standard Pressed Steel Co.

Cranes (Diesel Electric Steam, Etc.)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lewis-Shepard Sales Corp.
Lima Locomotive Works (Shovel & Crane Div.)
Link-Belt Co.
Universal Crusher Co.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lima Locomotive Works (Shovel & Crane Div.)
Link-Belt Co.

Crawler Attachments
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Link-Belt Co.

Crusher Parts
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Austin-Western Road Machy. Co.
Brooks Equipment & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsi.)
Dixie Machy. Mfg. Co.
Sturtevant Mill Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon, Inc.
Dixie Machinery Mfg. Co.
Gay, Rubert M., Div.
Hardinge Co., Inc.
Lewistown Fdy. & Mach. Co. (Jaw)
McLanahan & Stone Corp.
New Holland Machine Co.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Laboratory)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Allis-Chalmers Mfg. Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Reduction)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Co.
Besser Mfg. Co.
Brooks Equipment & Mfg. Co.
Eagle Iron Works
Hardinge Co., Inc.
Link-Belt Co.
McLanahan & Stone Corp.
New Holland Machine Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.
Universal Crusher Co.

Crushing and Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Blaw-Knox Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Link-Belt Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Dedusters
Blaw-Knox Co.
Pangborn Corp.

Dehydrators
Pioneer Engineering Wks., Inc.

Derricks
Hayward Company

Detonators
Ensign-Bickford Co.

Dewatering Machines
Allis-Chalmers Mfg. Co.
Eagle Iron Wks.
Hardinge Co., Inc.
Jaeger Machine Co.
Link-Belt Co.
Morris Machine Works

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel
Bucyrus-Erie Co.
Link-Belt Co.

Disentegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.

Dragline Cableway Excavators
American Cable Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Lima Locomotive Works, (Shovel & Crane Div.)
Link-Belt Co.
Sauerman Bros., Inc.

Dredges
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc. (Complete Steel)

Announcement

Twenty-Second Annual Convention
NATIONAL CRUSHED STONE ASSOCIATION

In conjunction with which will be held

THE MANUFACTURERS' DIVISION EXPOSITION OF MACHINERY, EQUIPMENT, AND SUPPLIES

NETHERLAND PLAZA HOTEL
CINCINNATI, OHIO

JANUARY 30, 31 AND FEBRUARY 1, 1939

The Annual Convention of the National Crushed Stone Association, during the years since its inception, has become recognized as an event of outstanding significance to crushed stone producers individually and to the industry as a whole.

It serves, as no other medium can, to develop, crystalize, and express industry opinion. It signifies solidarity of purpose and the ablity of those engaged in the same line of activity to unite in the solution of common problems.

As individuals, producers will find much to reward them for a visit to Cincinnati. Speakers of outstanding reputation and experience will discuss problems of timely interest, both technical and legislative; opportunity will be afforded for the mutually beneficial exchange of opinions with fellow-producers, to say nothing of the pleasure to be derived from renewing old acquaintanceships; the Manufacturers' Division Exposition will command studious attention for the helpful suggestions to be obtained from an inspection of the latest developments and improvements in machinery and equipment used in the crushed stone industry.

All crushed stone producers of the United States and Canada, whether or not members of the National Crushed Stone Association, are cordially invited to attend our Twenty-second Annual Convention. Make your plans now to be present at Cincinnati on January 30, 31 and February 1, 1939.

NATIONAL CRUSHED STONE ASSOCIATION

1735 FOURTEENTH STREET N. W. . . WASHINGTON, D. C.

Classified Directory (Cont.)

Lawrence Machine & Pump Corp.
Link-Belt Co.
Morris Machine Works

Dredge Cutter Heads & Ladders
Eagle Iron Wks.
Hetherington & Berner, Inc.

Dredge Hulls
Eagle Iron Wks.

Dredging Sleeves
Hetherington & Berner, Inc.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills (Well)
Bucyrus-Erie Co.

Drill Bits
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drilling Accessories
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drives (Belt, Chain and Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.
Smidth, F. L., & Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Combustion Engineering Corp.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Lewistown Foundry & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pangborn Corp. (sand)
Raymond Pulverizer Division
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Warren Brothers Road Co.
Williams Patent Crusher & Pulv. Co.

Dryer (Coolers)
Warren Brothers Road Co.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Pangborn Corp.
Raymond Pulverizer Division
Sly, W. W., Mfg. Corp.
Smidth, F. L., & Co.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
Blaw-Knox Co.
Fuller Company
Sly, W. W., Mfg. Corp.

Dust Collector Bags
Pangborn Corp.
Sly, W. W., Mfg. Corp.

Electric Motors
Allis-Chalmers Mfg. Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.

Elevators
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Besser Mfg. Co.
Eagle Iron Works
Fuller Company
Gay, Rubert M., Div.
Haiss, Geo., Mfg. Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Lewis-Shepard Sales Corp.
Lewistown Foundry & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
New Holland Machine Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Stearns Mfg. Co.
Sturtevant Mill Co.
Syntron Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Engineers
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Morris Machine Works
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gasoline, Kerosene and Oil)
Allis-Chalmers Mfg. Co.
Ball-Muncie Engine Co.
National Supply Co.
New Holland Machine Co.
Nordberg Mfg. Co.
Superior Diesel

Engines (Natural Gas)
Allis-Chalmers Mfg. Co.

Engines (Steam)
Allis-Chalmers Mfg. Co.
Morris Machine Works
Nordberg Mfg. Co.

Exhauster
Combustion Engineering Co.
Raymond Pulverizer Division

Explosives
Atlas Powder Co.

Fans (Exhaust & Ventilating)
Blaw-Knox Co.
Pangborn Corp.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
B. F. Sturtevant Co.

Feeders
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Earle C Bacon, Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Gay, Rubert M., Div.
Hardinge Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Stearns Mfg. Co.
Syntron Co. (vibrating)
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

Feeders Weighing (Vibrating)
Syntron Co.

Filter Cloth
Pangborn Corp.
Roebling's, John A., Sons Co.
Tyler, W. S., Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Forgings
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.

Classified Directory (Cont.)

Fuels (Diesel)
Texas Co.

Fuses (Detonating and Safety)
Atlas Powder Co.
Ensign-Bickford Co.

Fuse Cutters
Ensign-Bickford Co.

Fuse Lighters
Ensign-Bickford Co.

Gasoline
Gulf Refining Co.
Texas Company

Gears
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.

Generators & Motor Generator Sets
Allis-Chalmers Mfg. Co.
Electric Machinery Mfg. Co.
National Supply Co.
Nordberg Mfg. Co.
Superior Diesel
Syntron Co.

Glass Sand Equipment
Lewistown Fdry. & Mach. Co

Gloves
Pangborn Corp.

Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.

Grease
Bacon, Earle C., Co.
Gulf Refining Co.
Texas Company

Grease Cups
Link-Belt Co.
Robins Conveying Belt Co.

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
Harrington & King Perforating Co.
Tyler, W. S., Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Morris Machine Works

Gypsum Plants
Traylor Engr. & Mfg. Co.

Hoists (Chain, Electric, Portable, Skip, Etc.)
Allis-Chalmers Mfg. Co.
Besser Mfg. Co.
Commercial Shearing & Stamping Co.
Eagle Iron Works
Gay, Rubert M.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engr. Wks.
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.

Hoppers
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Gay, Rubert M., Div.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
Dixie Machinery Mfg. Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Morris Machine Works
Pangborn Corp.

Hydrators (Lime)
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.

Jigs (Sand and Gravel)
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Traylor Engineering & Mfg Co.

Kilns Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Kilns (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
F. L. Smidth & Co.
Traylor Engineering & Mfg Co.

Kilns (Shaft)
Hardinge Co., Inc.

Kilns (Vertical)
Blaw-Knox Co.
Hardinge Co., Inc.

Kiln Burners
Babcock & Wilcox Co.
Smidth, F. L., & Co.

Kiln Chain Systems
Smidth, F. L., & Co.

Kiln Liners (Metal)
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.

Kominuters
Smidth, F. L., & Co.

Laboratory Apparatus
Smidth, F. L., & Co.

Lift Trucks
Besser Mfg. Co.
Lewis-Shepard Sales Corp.
Stearns Mfg. Co.

Lime Handling Equipment
Fuller Co.
Hardinge Co., Inc.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.

Lime Plants
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Loaders (Bin, Car, Hopper, Truck, Etc.)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Fuller Company
Gay, Rubert M.
Geo. Haiss Mfg. Co., Inc.
Link-Belt Co.
New Holland Machine Co.
Northwest Engr. Co.
Robins Conveying Belt
Ross Screen & Feeder Co.
Stearns Mfg. Co.
Universal Road Machy. Co.

Loaders (Boat)
Link-Belt Co.

Loaders (Box Car)
Barber-Greene Co.
Link-Belt Co.

Loaders (Underground)
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Locomotives (Diesel & Diesel-Electric
Fate-Root-Heath Co.
Plymouth Locomotive Wks.

Locomotives (Electric, Trolley & Storage Battery)
Davenport-Besler Corp.

Locomotives (Gasoline & Gas-Electric)
Fate-Root-Heath Co.

Plymouth Locomotive Wks.

Locomotives (Oil & Oil-Electric)
Fate-Root-Heath Co.
Plymouth Locomotive Wks.

Classified Directory (Cont.)

Locomotives (Steam)
Davenport-Besler Corp.

Locomotive Stack Netting
Tyler, W. S., Co.

Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Standard Oil Co. (Ind.)
Texas Co.

Manganese Steel Parts
Bacon, Earle C., Inc.

Material Handling Equipment
Allen-Sherman-Hoff Co.
Austin-Western Road Machy. Co.
Barber-Greene Co.
Fuller Company
Hardinge Co., Inc.
Link-Belt Co.
Raymond Pulverizer Division
Robins Conveying Belt Co.
Syntron Co.

Measuring Devices
Blaw-Knox Co.
Jaeger Machine Co.

Motors (Electric)
Electric Machinery Mfg. Co.

Mill Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Mills, Grinding (Ball, Tube, Hammer, Rod, Roll, Etc.) (See also Pulverizers)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Babcock & Wilcox Co.
Brooks Equipment & Mfg. Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jackson & Church Co.
Lewistown Foundry & Mach. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Mill Liners
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsi.)
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mortar Colors
Mepham, Geo. S., Corp.

Mortar Mixers
Eagle Iron Works
Jaeger Machine Co.

Nails
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)

Nozzles (Gravel Washing)
Link-Belt Co.
Pangborn Corp.

Nuts
Standard Pressed Steel Co.

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Standard Oil Co. (Ind.)
The Texas Co.

Oils (Cutting)
The Texas Co.

Ornamental Forms (Concrete)
Besser Mfg. Co.

Pallets
Anchor Concrete Machinery Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Commercial Shearing and Stamping Co.
Multiplex Concrete Machy Co
Stearns Mfg. Co.

Pans, Grinding (Wet & Dry)
Eagle Iron Works
Jackson & Church Co.
Traylor Engineering & Mfg. Co.

Perforated Metal
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Chicago Perforating Co.
Harrington & King Perf. Co
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Joseph T. Ryerson & Son, Inc.
Traylor Engr. & Mfg. Co.

Perforated Screen Plates & Cloth—See Screen Cloth & Plates

Pinions
Bacon, Earle C., Inc.
Haiss, Geo., Mfg. Co.
Link-Belt Co.

Pipe Molds and Machines (Concrete)
Besser Mfg. Co.
Concrete Pipe Machy. Co.
Stearns Mfg. Co.

Pipe
Hetherington & Berner, Inc.
Morris Machine Works

Pipe Fittings
Hetherington & Berner, Inc.
Walworth Co.

Plaster Colors
Mepham, Geo. S., Corp.

Pontoons
Eagle Iron Works
Morris Machine Works

Powder (Blasting)
Atlas Powder Co.

Power Transmission Machinery
Allis-Chalmers Mfg. Co.
Link-Belt Co.
McNally-Pittsburg Mfg. Corp.
Standard Pressed Steel Co.
Timken Roller Bearing Co.

Precipitators
Pangborn Corp.

Pulleys
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Link-Belt Co.
Robins Conveying Belt Co.

Pulverizer Parts
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See Also Mills & Crushers)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsi.)
Combustion Engr. Corp.
Dixie Machy. Mfg. Co.
Gay, Rubert M., Div.
Hardinge Co., Inc.
Lewistown Foundry & Mach. Co.
McNally-Pittsburg Mfg. Corp.
New Holland Machine Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Hardinge Co., Inc.
Jaeger Machine Co.

Pumps (Dredge)
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Hetherington & Berner, Inc.
Lawrence Machine & Pump Corp.
Morris Machine Wks.

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ROCK CRUSHER and BELT CONVEYOR JUNCTION

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You may have a dust problem which originates from a rock crusher (any type) and a belt conveyor junction. Depending on local conditions the solution is simple and inexpensive by using ONE SLY UNIT FILTER.

A suitably designed hood is necessary at the crusher and belt conveyor junction. A crusher hood usually requires an 8" dia. exhaust pipe connection. Because the dust created at the junction is easier to control, a smaller 4" dia. exhaust connection is generally adequate. A dual pipe or a large main pipe is used in joining these connections to the Unit Filter Case.

Piping and fan power expense can be cut to a minimum by installing the filter within 25 feet of the connections. In this case a 3 H.P. motor will efficiently drive the fan.

For the solution to your particular problem, consult an experienced Sly engineer. He will make correct recommendations.

For complete and immediate details, write for Bulletin R-93.

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By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

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OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
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PATENT CRUSHERS GRINDERS SHREDDERS

Classified Directory (Cont.)

Pumps (Dry Pulverized Material)
Babcock & Wilcox Co.
Fuller Company
Morris Machine Works
Smidth, F. L., & Co.

Pumps (Slurry)
Allen-Sherman-Hoff Co.
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Lawrence Machine & Pump Corp.
Morris Machine Wks.
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pumps Valves (Slurry)
Fuller Co.
Wilfley, A. R., & Son, Inc.

Pumps (Vacuum)
Allis-Chalmers Mfg. Co.
Fuller Company
Smidth, F. L., & Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Water)
Allis-Chalmers Mfg. Co.
Jaeger Machine Co.
Lawrence Machine & Pump Corp.
Morris Machine Wks.

Rectifiers
Allis-Chalmers Mfg. Co.

Recuperators
Traylor Engineering & Mfg Co.

Refractories
Smidth, F. L., & Co.

Regulators (Voltage)
Allis-Chalmers Mfg. Co.

Respiratory Equipment
Pangborn Corp.

Rewashers (Screw)
Link-Belt Co.
Smith Engineering Works

Roofing
Ryerson, Jos. T., & Son, Inc.
Texas Co.

Rope (Transmission)
Allis-Chalmers Mfg. Co.

Sand Blast Equipment
Pangborn Corp.

Sand Drags
Eagle Iron Wks.
Link-Belt Co.
Smith Engr. Wks.

Sand and Gravel Plants
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy Co.
Bacon, Earle C., Co.
Eagle Iron Works
Hardinge Co., Inc.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Traylor Engineering & Mfg Co.

Sand Lime Brick Machinery
Hardinge Co., Inc.
Jackson & Church Co.

Sand Separators
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Simplicity Engineering Co.
Smith Engineering Wks.

Sand Settling Tanks
Eagle Iron Wks.
Hendrick Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engineering Wks., Inc.
Smith Engr. Wks.

Scales (Truck and Track)
Hardinge Co., Inc.

Scrapers (Power Drag)
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Company
Link-Belt Co.
Northwest Engr. Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc.

Screen Cloth & Plates (Perforated)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Traylor Engineering & Mfg. Co.

Screen Parts
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Pioneer Engineering Wks., Inc.
Traylor Engineering & Mfg. Co.

Screens (Grizzly)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Eagle Iron Works
Gay, Rubert M., Div.
Hendrick Mfg. Co.
Lewistown Foundry & Mach. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Universal Road Machy. Co.
Universal Vibrating Screen Co.

Screens (Laboratory)
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Link-Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Eagle Iron Wks.
Gay, Rubert M., Div.
Haiss, Geo., Mfg. Co., Inc.
Hardinge Co., Inc.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Road Machy. Co.

Screens, Scalping
Allis-Chalmers Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Eagle Iron Works
Hardinge Co., Inc.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
McNally-Pittsburg Mfg. Corp.

Classified Directory (Cont.)

New Holland Machine Co.
Nordberg Mfg. Co
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smith Engineering Works
Sturtevant Mill Co.
W. S. Tyler Co.
Universal Vib. Screen Co.
Williams Patent Crusher & Pulv. Co.

Screws (Cap, Self Locking, Set, Hollow Set)
Standard Pressed Steel Co.

Seal Rings
Traylor Engineering & Mfg. Co.

Separators (Abrasive, Air, Moisture & Oil)
Pangborn Corp.

Septic Tanks Molds (Concrete)
Suburban Sanitation Systems Co.

Shafting
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Link-Belt Co.

Shale Planers
Eagle Iron Wks.

Sheaves
Allis-Chalmers Mfg. Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Eagle Iron Works
Haiss, Geo., Mfg. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Roebling's, John A., Sons Co.
Sauerman Bros.

Shovels (Compressed Air)
Nordberg Mfg. Co.

Shovels, Power (Diesel, Diesel-Air, Electric, Gasoline, Gas-Electric, Oil & Steam)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lima Locomotive Wks., Inc. (Shovel & Crane Div.)
Link-Belt Co.
Northwest Engr. Co.

Shovels (Tractor)
Austin-Western Road Machy. Co.
Lima Locomotive Wks., Inc. (Shovel & Crane Div.)
Link-Belt Co.

Shovels (Underground)
Allis-Chalmers Mfg. Co.
Lima Locomotive Wks., Inc. (Shovel & Crane Div.)
Nordberg Mfg. Co.

Shredders
Williams Patent Crusher & Pulv. Co.

Sieves (Testing)
Hendrick Mfg. Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.

Silos
Blaw-Knox Co.
F. L. Smidth & Co.

Silo Stave Machines (Concrete)
Besser Mfg. Co.

Skids
Besser Mfg. Co.
Lewis-Shepard Sales Corp.

Slakers (Rotary)
Traylor Engineering & Mfg Co.

Slugs (Grinding)
Smidth, F. L., & Co.

Slurry Mixers
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Slurry Separators
Smidth, F. L., & Co.

Slurry Thickeners
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Smokestacks
Hendrick Mfg. Co.
Traylor Engineering & Mfg. Co.

Speed Reducers
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Spouts
Link-Belt Co.
Traylor Engineering & Mfg. Co.

Sprockets
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Link-Belt Co.

Standpipes
Ross Screen & Feeder Co.

Steel, Abrasion Resisting
Joseph T. Ryerson & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Steel (Special Alloy)
Timken Roller Bearing Co.

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.
Link-Belt Co.

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Stucco Colors
Mepham, Geo. S., Corp.

Switchboards
Allis-Chalmers Mfg. Co.

Tampers (Power & Hand)
Besser Mfg. Co.
Multiplex Concrete Machy Co
Stearns Mfg. Co.
Syntron Co.

Tanks
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Combustion Engineering Corp.
Eagle Iron Works
Hardinge Co., Inc.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Raymond Pulverizer Division
Traylor Engineering & Mfg. Co.

Towers
Blaw-Knox Co.
Eagle Iron Works
Hendrick Mfg. Co.
Jaeger Machine Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Track & Track Equipment
Besser Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsi.)
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Link-Belt Co.

Tractors
Allis-Chalmers Mfg. Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial & Quarry)
Allis-Chalmers Mfg. Co.
Athey Truss Wheel Co.
Austin-Western Road Machy. Co.

Transformers
Allis-Chalmers Mfg. Co.

Trucks (Agitator)
Blaw-Knox Co.

Classified Directory (Cont.)

Truck Bodies (Dump)
Commercial Shearing & Stamping Co.

Trucks (Hand)
Standard Pressed Steel Co.

Trucks (Industrial)
Lewis-Shepard Sales Corp.
Standard Pressed Steel Co.

Trucks (Mixers)
Blaw-Knox Co.
Jaeger Machine Co.
Smidth, F. L., & Co.
Smith, T. L., Co., The

Tubing (Seamless Steel)
Timken Roller Bearing Co.

Turbines
Allis-Chalmers Mfg. Co.
B. F. Sturtevant Co.

Unloaders
Barber-Greene Co.
Bucyrus-Erie Co.
Fuller Company
Gay, Rubert M., Div.
Haiss, Geo., Mfg. Co.
Link-Belt Co.
New Holland Machine Co.
Northwest Engr. Co.
Robins Conveying Belt Co.
Universal Road Machy. Co.

Unloaders (Boat)
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Fuller Co.
Gay, Rubert M., Div.
Link-Belt Co.
Universal Road Machy. Co.

Unloaders (Pneumatic)
Fuller Company

Unloaders (Underground)
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.
Pangborn Corp.

Vacuum Cleaners
B. F. Sturtevant Co.

Valves
Walworth Co.

Vibrators
Link-Belt Co.
Stearns Mfg. Co.
Syntron Co. (Electric)
W. S. Tyler Co.

Wagons (Dump)
Allis-Chalmers Mfg. Co.
Athey Truss Wheel Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.

Washers (Log)
Allis-Chalmers Mfg. Co.
Eagle Iron Works
Hardinge Co., Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Eagle Iron Works
Gay, Rubert M., Div.
Haiss, Geo., Mfg. Co.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Lewistown Foundry & Mach Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engineering Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Universal Road Machy. Co.

Weighing Equipment
Blaw-Knox Co.
Fuller Company
Hardinge Co., Inc.
Jaeger Machine Co.

Welding Electrodes
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)

Welding Rods
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc.

Welding Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.

Wheels (Tracklaying Type)
Athey Truss Wheel Co.

Winches
Link-Belt Co.
Robins Conveying Belt Co.

Wire Cloth
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bacon, Earle C., Co.
Cleveland Wire Cloth & Mfg Co.
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
McNally-Pittsburg Mfg. Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

Wire (Copper, Iron & Steel)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.

Wire Cutters
H. K. Porter, Inc.

Wire (Electric)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Roebling's, John A., Sons Co.

Wire Rope
American Cable Co., Inc.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Jones & Laughlin Steel Corp.
A. Leschen & Sons Rope Co.
Roebling's, John A., Sons Co.

Wire Rope Clips
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Leschen, A., & Sons Rope Co.

Wire Rope Fittings
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Leschen, A., & Sons Rope Co.
Roebling's, John A., Sons Co.

Wire Rope Hooks
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Leschen, A., & Sons Rope Co.
Roebling's, John A., Sons Co.

Wire Rope Lubricants
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Roebling's, John A., Sons Co.

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Roebling's, John A., Sons Co.

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Leschen, A., & Sons Rope Co.
Roebling's, John A., Sons Co.

Classified Advertisements

POSITIONS WANTED — POSITIONS VACANT Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION—Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

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GOOD USED EQUIPMENT

SELECTED SPECIALS

JAW CRUSHERS:
6x36, 10x15, 13x30, 15x30, 24x36 Farrel; 18x30, 24x36 Allis Chalmers; 30x60, 36x42 Traylor.

CRUSHING ROLLS:
1—42"x16" "B" Allis Chalmers, used one month; 24x14" A-C; 30x14", 20x14" Sturtevant; 30x10" Traylor; 24x20", 18x16" single roll crushers.

PULVERIZERS:
Raymond 4 and 5 roll high and low side, also two No. 60 Imp. and rigid beater types; 24" Mikro; and other types.

AIR CLASSIFIERS:
5', 10' Sturtevant; 5', 8', 12', 14' Gayco.

BALL, ROD AND TUBE MILLS:
No. 32 Marcy, 6'x22" Hardinge, 3x12' Hendy, 5x22' Gates, all iron lined; 5x10' Marcy, 6'x12' Hardinge Rod Mills.

HAMMER MILLS:
36x36" Gruendler with roller bearings, all new mang. parts; 36x24 Gruendler; 24x20, 24x12 Jeffrey; larger and smaller sizes.

ROTARY KILNS AND DRYERS:
2—6'x60', ¾" shells, silent chain drives and motors. Will be sold with or without motor driven Detroit Underfeed Stokers. 1—9'6"x 150' Rotary Kiln — also smaller sizes. 12—Rotary Dryers: 3x30, 4x30, 5x30, 5x60, 6x40, 6x60, 8x60, 9x65'.

Send for Illustrated Circulars.

Consolidated Products Co., Inc.
15-16-17 Park Row New York City
8 Acre Plant & Shops at Newark, N. J.

42x48" & 60x84" Traylor Jaw Crushers. No. 9 Gyratory Crushers. Gates & Telsmith. 16" also 13-A Telsmith Primary Gyratorys. No. 36 Telsmith Gyrasphere—or 3 ft. cone. 20 ton standard gauge Gasoline Locomotive. ¾ yd. Northwest Shovel-Crane-Dragline. Diesel Engines—all makes 25 HP to 1150 HP. 120 ton Railroad Track Scale, 50' platform.

Mississippi Valley Equipment Co.
515 LOCUST ST. ST. LOUIS, MO.
Send for Bulletin No. 116.

Description of Second Hand Equipment in Good Operating Condition Available for Inspection of Our Plant at Thomasville, Penna.

1—Rotary Screen—19 Ft. overall, consisting of 2—8 ft. x 4 ft. Sections, End Drive, Head and Tail Rings and Rollers. Also additional screen plates for above screen running in size from ⅝" Rings to 4" Rings.

1—Rotary Screen—22 Ft. overall, consisting of 2—6 ft. x 38 in. Sections, and 1—5 ft. x 38 in. Section, Center Drive, Bevel Gears, Head and Tail Rings and 3—Sets of Rollers. Also additional screen plates for this screen running in size from ⅝" Rings to 4" Rings.

1—Bucket Elevator, with 65 Ft. Centers, equipped with No. 647 Manganese Steel Chain, and 86—12" x 24" Buckets. Complete with Head and Tail Sprockets with Shafts and Take-ups. Head Driven, Gear Drive. Also extra buckets and links.

Thomasville Stone & Lime Co.
Thomasville, Penna.

FOR SALE

Bucyrus 52-B, 2¼-yard, combination shovel and dragline, 197 h.p. Atlas Imperial diesel engine, built 1935, located Birmingham.

Osgood one yard electric caterpillar combination shovel and dragline or crane, built 1929, located Pittsburgh.

American 8-wheel 30 ton steam locomotive crane, 65' boom, built 1928, located Chicago.

Browning 8-wheel 25 ton steam locomotive crane, 50' boom, built 1926, located Pittsburgh.

Brownhoist 8-wheel 15 ton steam locomotive crane, 50' boom, built 1920, new boiler 1928, located Buffalo.

Western heavy duty 36" gauge steel underframe 5-yard 2-way side dump cars (50 in lot).

Western standard gauge 12-yard steel underframe 2-way air side dump cars (30 in lot).

Complete stock list on request.

Birmingham Rail & Locomotive Company
Birmingham, Alabama

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72—12 cu. yd. 30-Ton 8-wheel Std. Ga. Western air Dump Cars; approx. 13½ tons of Steel. **ONLY $225.00 each for all—$250.00 for less!!** K. C., St. L., Chgo. or Buf. Deliveries.

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"Anything containing IRON or STEEL"

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BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
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DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110, 160, 220, 310 & 540 Ft.
STEAM: 49, 310, 528 & 1300 Ft.

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1⅛ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E.

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12 Ton KOEHRING 45 Ft. Boom Gas.
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25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.

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⅝ Yd. KOEHRING Gasoline.
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RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
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GRUENDLER XXB Mill & Jay Bee No. 3 & 4.
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1—1,200 bbl. Blaw Knox round bulk cement bin with 2,000 lbs. weigh batcher.

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1—Link Belt K-42, ser. No. 1265, 45′ boom, 1¼ yd. bucket; also have 1 yd. trench hoe attachment or 1¼ yd. shovel front.

2—Northwest mod. 105, ser. Nos. 2053 & 1522, 40′ boom, 1 yd. bucket.

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1—Osgood Heavy Duty, ser. No. 2069, 40′ boom, 1 yd. bucket & with 1 yd. shovel attachment.

1—Northwest mod. 2, ser. No. 4797, 40′ boom, ½ yd. bucket.

1—Universal mod. 35, ser. No. 1200, 56′ boom, ½ yd. bucket.

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1—25 ton Browning steam crane No. 1854, 8 wheel, std. ga., 50′ boom.

1—12 ton Brownhoist gas crane No. 2, ser. No. 8881, 8 wheel, 40′ boom.

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5—Gyratory: 1—20″ Kennedy; 1—12″ Kennedy; 1—No. 3 McCulley; 1—No. 19 Kennedy fine reduction; 1—No. 0 McCully.

4—Jaw: 1—18″x36″ Farrel-Bacon; 1—10″x20″ Climax No. 2½; 1—9″x16″ Telsmith No. 9A; 1—9″x15″ Champion.

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6—Wagon drills, Ing. Rand & Gardner Denver with IRX-71 and Gardner Denver 17 & 21 drills.

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4—Steel stiff leg: 1—15 ton Clyde, 50′ boom; 1—15 ton Clyde "A" frame barge derrick, 50′ boom; 1—10 ton Insley, 80′ boom; 1—5 ton Insley, 80′ boom.

6—Steel guy derricks: 1—15 ton Terry, 115′ mast, 100′ boom; 1—10 ton American, 115′ mast, 100′ boom; 3—6 ton Bedford, 90′ mast, 80′ boom; 1—5 ton Dobbie, 70′ mast, 58′ boom.

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All hoists can be furnished with attached or independent swinging gears.
600 Hoisting duty Electric Motors with controllers and resistors.

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155 bbls. Fuller cement bin, electric weigh batchers.
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Cone—24, 36, 48.
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Clyde 3 drum & attached swinger, electric hoist, 75 h.p.

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INDEX TO ADVERTISERS

Announcing

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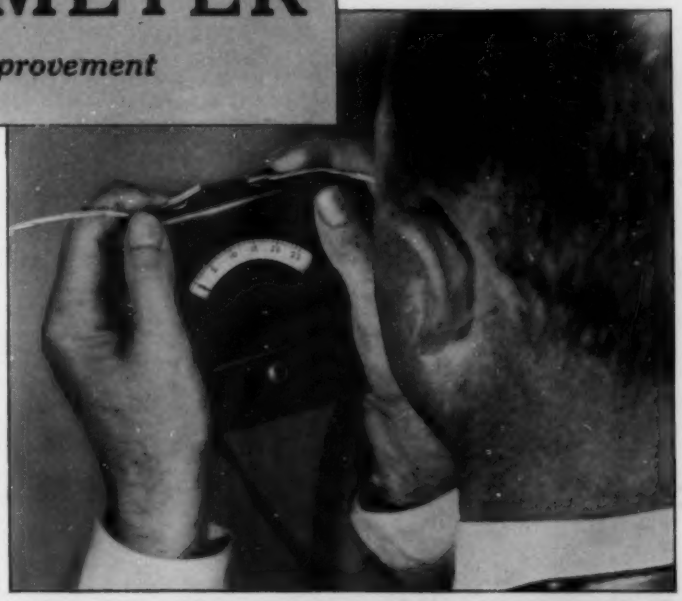

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